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DAMAGED AND THREATENED
NATIONAL NATURAL LANDMARKS

1996

COMPLETED

NE98-032071

INTRODUCTION

Section 8 of the National Park System General Authorities Act of 1970, as amended, requires the Secretary of the Interior to monitor the status and condition of National Natural Landmarks (NNLs) and report on those that are threatened or damaged. In response to this mandate, the Section 8 Report is prepared by the National Park Service each year and submitted to Congress.

The report that follows, **Damaged and Threatened National Natural Landmarks for 1996**, lists those landmarks that are judged to be threatened or damaged to a degree that the nationally significant features for which the sites were designated are in jeopardy.

National Park Service
U.S. Department of the Interior
Washington, D.C. 20013-7127

THE NATIONAL NATURAL LANDMARKS PROGRAM

The National Natural Landmarks (NNL) Program was established in 1962 by the Secretary of the Interior to encourage the preservation of the best remaining examples of the major biotic communities and geologic features composing the nation's natural landscape. It is the only natural areas program of national scope that identifies and recognizes the best examples of both biological and geological features in both public and private ownership.

Sites considered for possible NNL designation are identified primarily through inventory studies conducted by the National Park Service (NPS) or by contractors under NPS direction. Recommendations received from non-NPS sources are also considered in relationship to those in the above-mentioned inventories. Highly recommended areas are then surveyed in the field and evaluated comparatively by expert natural scientists with respect to selection criteria. Areas judged to be the best examples of ecological or geological features are nominated to the Secretary of the Interior for designation as NNLs and, if designated, are listed on the National Registry of Natural Landmarks. To date, 587 sites in 48 states, 3 territories, and the Commonwealth of Puerto Rico have been designated as NNLs.

Natural landmark designation is not a land withdrawal, does not change the ownership of a site, and does not dictate activity. The Secretary employs the designation of nationally significant natural areas to encourage their voluntary preservation, their well-informed management, and their consideration in public and private planning efforts through public recognition. Federal agencies should consider the unique properties of the landmark in National Environmental Policy Act (NEPA) compliance; there may also be state or local planning or land use implications.

EXECUTIVE SUMMARY

In 1976, the Congress amended Section 8 of the National Park System General Authorities Act of 1970 to require the Secretary to monitor the status of both national natural landmarks (NNL) and national historic landmarks and report annually on those determined to be threatened or damaged. This document serves as that report for 1996.

An NNL is listed in the Section 8 report if the site is threatened or damaged to a degree that the nationally significant features for which it was designated are in jeopardy. The General Authorities Act states that "The Secretary is also directed to transmit annually...a complete and current list of all areas included on the Registry of Natural Landmarks...which areas exhibit known or anticipated damage or threats to the integrity of their resources, along with notations as to the nature and severity of such damage or threats." The report is based upon information in site inspection reports or other information provided on specific NNLs. The goal of the National Park Service (NPS) is to monitor the condition of each NNL approximately every other year.

In 1996, inspection reports or other information were submitted for 294 sites, or 50.1% of the 587 NNLs currently listed on the National Registry of Natural Landmarks. From that information, the NPS identified the following 64, or 10.9% as damaged or threatened. Those sites marked with an asterisk (6 sites) were not included in the 1995 report.

Mobile-Tensaw River Bottomlands, Alabama
Newsome Sinks Karst Area, Alabama
Bogoslof Island, Alaska
Big Lake Natural Area, Arkansas
Cinder Cones Natural Area, California
Fish Slough, California
Nipomo Dunes-Point Sal Coastal Area, California
San Felipe Creek, California
Tijuana River Estuary, California
Russell Lakes, Colorado
Big Cypress Bend, Florida
Paynes Prairie, Florida
Reed Wilderness Seashore Sanctuary, Florida
**Ebenezer Creek Swamp, Georgia
Kanaha Pond, Hawaii
Makalawena Marsh, Hawaii
Hagerman Fauna Sites, Idaho
Menan Buttes, Idaho
Heron Pond-Little Black Slough, Illinois
Lower Cache River Swamp, Illinois
Markham Prairie, Illinois
Volo Bog Nature Preserve, Illinois
Wauconda Bog Nature Preserve, Illinois
Hoosier Prairie, Indiana

Kramer Woods, Indiana
Baker University Wetlands, Kansas
Penny Pond-Joe Pond Complex, Maine
Belt Woods, Maryland
Long Green Creek and Sweathouse Branch, Maryland
Gay Head Cliffs, Massachusetts
Lynnfield Marsh, Massachusetts
**Haven Hill Natural Area, Michigan
Tobico Marsh, Michigan
Big Oak Tree, Missouri
**Ancient River Warren Channel, Minnesota
Bitter Lake Group, New Mexico
Petrified Gardens, New York
Mount Mitchell State Park, North Carolina
Nags Head Woods and Jockey's Ridge, North Carolina
Smith Island, North Carolina
Rush Lake, North Dakota
Dysart Woods, Ohio
Mentor Marsh, Ohio
Serpent Mound Cryptoexplosive Structure, Ohio
Newberry Crater, Oregon
**Wissahickon Valley, Pennsylvania
Presque Isle, Pennsylvania
Rio Abajo, Puerto Rico
Buffalo Slough, South Dakota
Lake Thompson, South Dakota
Reelfoot Lake, Tennessee
Santa Ana National Wildlife Refuge, Texas
Natural Bridge Caverns, Texas
Salt River and Sugar Bay, U.S. Virgin Islands
Molly Bog, Vermont
Virginia Coast Reserve, Virginia
**Big Run Bog, West Virginia
Canaan Valley, West Virginia
Drumheller Channels, Washington
**Point of Arches, Washington
Germany Valley Karst Area, West Virginia
Baraboo Range, Wisconsin
Cave of the Mounds, Wisconsin
Kickapoo River Natural Area, Wisconsin

The following 2 sites, listed in the 1995 Section 8 report, were removed from this report as inspections indicate that the problems threatening the NNL have been corrected.

Valles Caldera, New Mexico

The New Mexico Public Utility Commission had denied the Public Service Company of New Mexico permission to build the powerline.

Dinosaur Valley, Texas

The court upheld a decision denying the permit for construction and the Texas Parks and Wildlife Department feels the issue is now dead.

1996 Statistics

294 (50.1%) of the total 587 NNLs were reviewed by the NPS.[1]

64 (10.9%) of the total 587 NNLs are listed as threatened or damaged.

Comparison with Previous Reports

60 (93.7%) of the 64 NNLs listed in this report were also listed in the 1995 report.

6 (1.02%) of the 587 NNLs listed in this report have never been listed before.

2 (3.2%) of the 61 NNLs listed in the 1995 report have been dropped from this report because the problem has been resolved.

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[1] Site reporting includes onsite inspections, which are conducted by an NPS employee, an individual or organization acting on behalf of the NPS, or a site manager or employee of the landowning agency or organization.

INVENTORY OF NATIONAL NATURAL LANDMARKS
LISTED AS
THREATENED OR DAMAGED
IN 1996

Alabama

Name: MOBILE-TENSAW RIVER BOTTOMLANDS

Location: Baldwin, Mobile, and Washington Counties

Ownership: Federal (Army Corps of Engineers), State (Division of Lands), Private

Designation: May 1974 Section 8 Listings: 1977-1989, 1993-1996

SIGNIFICANCE This site is one of the most extensive and significant wetlands in the United States. The many different habitat types, ranging from mesic floodplain forests and freshwater swamps to open, brackish marshes, support a great variety of wildlife and plant species, including several rare and endangered species.

DESCRIPTION A 185,000-acre wetland and bottomland forest area, which includes saltwater, brackish water, and extensive hardwood forest.

THREAT OR DAMAGE

Source Activities:

- residential, commercial, industrial, transportation, construction/operation
- oil/gas extraction/exploration
- agricultural runoff

Resource Impacts:

- WATER: degradation of water quality
- potential alteration of coastal processes

Summary

Cumulative impacts from continued agricultural, residential, commercial, and industrial development and expanded oil and gas activities surrounding the site may be affecting the landmark. Pollutants from point and nonpoint sources, including transportation, construction, chemical, and industrial activities, may be becoming bound in the fine sediments. For example, oysters in Mobile Bay are known to contain concentrations of heavy metals. Water pollution results from discharge and inland gas exploration. The southern half of the landmark's western boundary is lined with heavy industry, including a number of chemical plants and a coal-fired electrical generation plant.

Development is expected to increase in the area. Residential developments are beginning to have some impacts along the southern half of the eastern boundary. On the west, heavy industry is spreading north along the Mobile River, increasing the probability of pollution. Commercial timber harvesting operations have the potential to cause loss of wildlife habitat, although the extent of timber harvesting will be reduced in the future as a result of land purchases made by the Army Corps of Engineers (Corps).

CURRENT SITUATION The size of the site, the large number of owners, and the relative inaccessibility by ground transport makes monitoring and protection difficult. A portion of the site was acquired by the Corps in connection with the Tennessee-Tombigbee Waterway Wildlife Mitigation Project, authorized by Section 601 of the Water Resources Development Act of 1986 (PL 99-662). This statute required the purchase of 88,000 acres from willing sellers at fair market value. Of this total, a minimum of 20,000 acres were to be acquired in the Mobile-Tensaw delta. Selection of lands is to be accomplished in consultation with the State wildlife agency and the U.S. Fish and Wildlife Service (FWS), with emphasis placed on predominantly floodplain forest lands.

Purchase of the mitigation lands began in 1990 and was essentially completed in 1992. A total of 20,009 acres have been acquired, which satisfies the authorization requirement. Although only minor purchases are anticipated through 1996 to even out existing acquisition boundaries, an additional 15,000 acres are still available in the site for purchase from willing sellers.

The mitigation lands bought by the Corps have been licensed (for a 50-year period) to the Alabama Department of Conservation and Natural Resources (ADCNR), which will manage the lands for wildlife with funding provided by the Corps. A management plan for these lands was jointly prepared by the Corps, FWS, and ADCNR in 1993.

Alabama

Name: NEWSOME SINKS KARST AREA Location: Morgan County

Ownership: Private

Designation: November 1973 Section 8 Listings: 1988-1989, 1993-1996

SIGNIFICANCE The site is a classic example of karst development, containing more than 40 caves. Illustrations of karst development of such magnitude and quality are rare in the United States.

DESCRIPTION The 1,700-acre site, a classic example of a karst valley, is about 4 miles long, 3/4 mile wide, and 400 feet deep. Over 50,000 feet of passages have been explored among its more than 40 caves. Both ends of the drainage basin are higher in elevation than the valley floor, forcing water runoff to escape through subterranean passageways.

THREAT OR DAMAGE

Source Activities:

- logging
- vandalism
- off-road vehicle (ORV) use

Resource Impacts:

VEGETATION: physical removal, with an increase in erosion and potential for influencing the groundwater of the cave system.

Summary

Logging has denuded some large tracts, which increases erosion and runoff and, thus, the possibility of degradation of subterranean resources. Several caves have been vandalized. Some ORVs have caused damage to the herbaceous layer.

CURRENT SITUATION Approximately 150 acres has been logged during the last 2 years by one of the absentee owners of property in the landmark. An additional 50 acres will likely be logged in the near future. Approximately 100 of these acres were clearcut of native hardwoods and the area replanted with pine. On the remaining acreage the seed tree method was used; all but a few of the hardwoods were cut and the remaining trees salvaged to provide seeds for regeneration. In the seed tree method as well as clearcutting, the soil remains exposed for long periods. A small field was bulldozed within 60 feet of a spring/waterfall/sinkhole/cave combination. Brush has been piled into some sinkholes.

A few non-resident ORV operators have caused vegetation damage and conflicts with some landowners. Some landowners use ORVs and think that roads are needed for search and rescue operations and fire suppression. ORV use has, however, declined over the last few years and trails are beginning to grow over. A few caves have suffered some vandalism. There are approximately 40 different private owners of the landmark, but only one lives in the area of damage. The Nature Conservancy met with over a dozen of the landowners of the Newsome Sinks Karst Area and encouraged them to work with the local Newsome Sinks Grotto and Huntsville Grotto to limit access to the area. Some landowners prefer not to cooperate with the cavers based on past experiences.

Alaska

Name: BOGOSLOF ISLAND Location: Bering Sea, 25 miles north of Umnak Island

Ownership: Federal (Fish and Wildlife Service)

Designation: October 1967 Section 8 Listings: 1992-1996

SIGNIFICANCE This site is a remnant of three volcanic eruptions, a rookery for Steller (Northern) sea lions, and nesting ground for over 50,000 seabirds, including the rare Red-legged Kittiwake. Bogoslof Island National Natural Landmark is the scene of continued active volcanism.

DESCRIPTION Bogoslof Island NNL includes all of Bogoslof Island and Fire Island above mean tide. The entire NNL is managed by the U.S. Fish and Wildlife Service (FWS) as part of the Alaska Maritime National Wildlife Refuge. At least six island masses rose here within 130 years, with remnants of the last three eruptions forming the present islands.

THREAT OR DAMAGE

Source Activities:

The status review of the Stellar sea lion reports that the proximate cause of the population decline to be chronically reduced juvenile survival coupled with episodic acute declines in adult survival. Changes in the prey base may be the ultimate cause of the Alaska population decline from the early 1980's to the present (National Marine Fisheries Service, 1995, Status Review of the United States Stellar sea lion (*Eumatopias jubata*) population, National Marine Mammal Laboratory, Seattle).

Resource Impacts:

ANIMALS: significant declines in numbers of some species

Summary

The numbers of Steller sea lions have declined markedly. Changes in the prey base may be the ultimate cause of the Alaska population decline from the early 1980's to the present. This may have nutritionally stressed sea lions (especially newly weaned juveniles) and such a stress may have led to increased mortalities from disease, starvation, or predation.

CURRENT SITUATION

The NMFS initiated a status review in 1994 to evaluate reclassifying the sea lion as "endangered" (NMFS, 58 FR 58318, November 1, 1993). The proposed ruling makes several important statements regarding the future of Stellar sea lions: "Since the 1990 listing, NMFS has received additional data on the status of the Steller sea lion population, and prepared a population viability analysis (PVA). This information...indicates that a change in listing status to endangered may be warranted...These data indicate that the Steller sea lion population decline has not abated, despite NMFS's recovery efforts to date...Furthermore, the PVA models, based on the observed 1985-1992 population trend, predict a high probability of extinction within 100 years....The next 20 years appear to be particularly critical...."

The Red-legged Kittiwake, a "species of special management concern", is endemic to the Bering Sea ecosystem. Over the last 20 years the population has declined in individual numbers and experienced generally poor reproductive success. A cooperative study by the Biological Resources Division of the U.S. Geological Survey and the University of Alaska, Fairbanks (UAF), will determine the Red-legged Kittiwakes' breeding population size, nest preferences, and characterize interspecific competition with the Black-legged Kittiwakes. The Alaska Maritime National Wildlife Refuge continues to monitor population status and trends for Red-legged Kittiwakes on Bogoslof Island. Bogoslof Island is one of five Red-legged Kittiwake nesting sites. An interagency survey of the Bogoslof Island colony was completed in 1994 and showed a three-fold increase in kittiwake numbers compared to a 1973 census. The U.S..Geological Survey/UAF study will be conducted on St. George Island in the Bering Sea, where 80% of the Red-legged Kittiwakes occur, and will help in understanding the Red-legged Kittiwake population on Bogoslof Island.

Arkansas

Name: BIG LAKE NATURAL AREA Location: Mississippi County

Ownership: Federal (Fish and Wildlife Service)

Designation: December 1974 Section 8 Listing: 1993-1996

SIGNIFICANCE Big Lake National Wildlife Refuge is the only large area remaining in northeast Arkansas containing a significant amount of virgin timber. There is a mix of southern, Ozark, and midwestern flora. The site supports several threatened or endangered species.

DESCRIPTION This 6,400-acre tract, located within the 11,037-acre refuge, contains a lake bordered by virgin cypress-tupelo swamp and southern bottomland hardwood forests. This site illustrates the northern extension of southern swampland and bottomland hardwood forest types up the Mississippi Embayment. The area stands out as a tract of natural forest surrounded by many square miles of agricultural land. A wilderness area in the refuge is 2,600 acres. A separate research natural area is 500 acres, and the wilderness area is 2,600 acres.

THREAT OR DAMAGE

Source Activities:
- flooding
- nonpoint source pollution
- siltation
- agricultural runoff

Resource Impacts:
- VEGETATION: tree mortality
- WATER: chemical contamination

Summary

There is a four-fold threat to the site: siltation, trash and debris, tree mortality, and possible chemical contamination.

CURRENT SITUATION The landmark receives runoff water from a farmed area of about 2,500 square miles. This area is drained by an extensive network of ditches developed by the Army Corps of Engineers. Waterways below the landmark and downstream construction slow out-flow. The result is excessive flooding and siltation in the landmark. The situation results in accelerated succession in the lake and tree mortality, especially oaks. The huge volumes of water channeled into the landmark bring massive accumulations of trash and debris. Another threat is chemical contamination from agricultural applications in the watershed. There is also some chemical dumping into the canals. This contamination is washed into the landmark. The Environmental Protection Agency in 1984 found high chlordane levels in fish, but the U.S. Fish and Wildlife Service (FWS) follow-up in 1986 found normal levels. The FWS has constructed a debris barrier at the north end of the refuge to catch debris before it enters the refuge, however, it is damaged and subject to failure at any time.

A 1992 study completed by the University of Arkansas for the U.S. Geological Survey documented high sedimentation rates in this refuge. This sedimentation is due to land clearing, agricultural land practices, digging of drainage ditches that rapidly deliver water and sediment to the lake, and construction of dams to permanently impound the lake. The sedimentation rate has doubled since the lake was created in 1811-1812; since 1935, the lake has lost one-third of its volume.

California

Name: CINDER CONES NATURAL AREA Location: San Bernardino County

Ownership: Federal (National Park Service), State (Land Commission)

Designation: May 1973 Section 8 Listings: 1977-1989, 1993-1996

SIGNIFICANCE The site contains highly illustrative examples of volcanic features, including cinder cones and lava flows.

DESCRIPTION This is a 25,600-acre volcanic field containing more than 20 large cinder cones within about 1/2 to 1 mile of each other. The cones rise 300 to 600 feet above the surrounding terrain and are estimated to be 1,000 to 5,000 years old.

THREAT OR DAMAGE

- Source Activities:
  - Surface mining
- Resource Impacts:
  - GEOLOGICAL RESOURCES: removal of cinders
- Summary
  - Active mining on Federal land continues at two sites, causing surface disturbance. One of the mining operators has been in operation since the 1950s. Evidence of access routes from past operations can be seen on almost all cones. The validity of claims involved in one of the mining operations is under examination.

CURRENT SITUATION The entire landmark is within Mojave National Preserve established by the California Desert Protection Act of 1994, Public Law 103-433, October 31, 1994 (108 Stat. 4471 - 4525). There are three mining operations that pose various threats to the landmark.

The denial of the validity claim of the Aiken Cinder Cone Mine is being contested by the claim holders. The latest determination that the claim is not valid has been appealed to the Interior Board of Land Appeals, and its decision is pending. If the claimants are upheld, then the resumption of cinder cone mining would constitute a serious threat to the landmark.

The Volco Mine claim will go through a validity examination with the claimants expected to file a plan of operations in the near future. If the validity of the claim is upheld, substantial damage would occur to one major cinder cone. The cinder cone affected is highly visible from Kelbaker Road which is heavily travelled and traverses the park from Interstate 15 in the northwest to Interstate 40 in the southwest.

The Cima Cinder Cone Mine owners have a claim which predates the establishment of the park in 1994. Under the California Desert Protection Act they have the right to continue the mining of cinders. Mining continues at the site, and the slow but cumulative and inexorable damage to the integrity of the landmark is ongoing.

Portions of the landmark are in a designated Wilderness Area, established using the Wilderness Act of 1964, Public Law 88-577 (78 Stat. 890 - 986). Some of those lands are included within the Cima Cinder Cone Mine claims and would not be protected from damage by mining activities.

With the passage of the California Desert Protection Act, further mineral entry is prohibited within the park, so no new claims can be filed. There are, however, over 3,000 outstanding claims within the park which remain unevaluated for validity. It is presently not known if any of these claims are within the boundaries of the landmark.

In December of 1993, the U.S. Fish and Wildlife Service designated lands within and surrounding the landmark as critical habitat for the desert tortoise, a listed species under the Endangered Species Act of 1973. However, this designation has little effect on either the integrity or the protection of the landmark.

California

Name: NIPOMO DUNES-POINT SAL COASTAL AREA

Location: San Luis Obispo and Santa Barbara Counties

Ownership: Federal (U.S. Air Force, Bureau of Land Management), State (Department of Parks and Recreation), County, Private

Designation: May 1974 Section 8 Listings: 1978-1989, 1993-1996

SIGNIFICANCE Nipomo Dunes constitutes the most extensive coastal dune tract in California and also supports rare and endangered plant and animal species. Point Sal represents one of the last remaining sections of pristine rocky coastline in the South Coast Ranges.

DESCRIPTION Nipomo Dunes and Point Sal comprise 15,900 acres in two contiguous tracts of land. The landmark complex extends for about 18 miles along the coast and 3 1/2 miles inland near its center, and contains freshwater lagoons and lakes, cliffs, rocky shores, and various types of dunes.

THREAT OR DAMAGE

Source Activities:

- visitor use--off-road vehicles (ORVs), vandalism, poaching
- water projects--channel construction, breakwater construction
- agricultural--cultivation, irrigation, erosion
- mining--sand
- oil industry construction--oil spill, refinery, and pipeline construction

Resource Impacts:

- VEGETATION: destruction or removal of dune vegetation, damage to wetland plant communities of the numerous freshwater springs, exotic species invasion
- WATER: channel alteration, current disruption
- GEOLOGIC RESOURCES: dune and beach erosion, extraction
- WILDLIFE: destruction or removal
- ECOSYSTEM: wetland drainage, destruction of beach, wetland spring, and dune communities

Summary

A massive oil spill was discovered in 1990, but only recently came to public attention. The central portion of Nipomo Dunes is suffering from grazing, agricultural runoff, and some sand mining. Pipeline construction at Nipomo Dunes is pending.

CURRENT SITUATION

Nipomo Dunes

Oil Spill:

The largest oil spill in California, the second largest in the United States, was discovered in 1990; about 8.5 million gallons of oil were spilled at Guadalupe Fields by Unocal Oil Corporation. It is estimated that oil has been leaking into the ocean and water table for the last 15 years. Some contend, once the site assessment is complete, the estimated size of the spill could exceed the Exxon Valdez' 11 million gallons. Unocal built a retaining wall underground in 1990 to prevent further migration of the oil, which was floating on the water table, into the bordering ocean and beach. Winter storms in 1992 affected the retaining wall by eroding the beach and exposing the wall, subjecting it to damage by waves and tidal action. Unocal has been accused of a coverup and charged with a 36-count criminal complaint by local government authorities. The attempts at oil recovery, which is estimated to be 5-feet deep in some places, have been to pump an estimated 650 thousand gallons from recovery wells. Unocal has also set up a countywide trust fund of $300,000 to benefit the environment of San Luis Obispo County and/or youth recreation. Currently the California Office of Oil Spill and Response is reviewing the case for possible California State action and suits. The Sierra Club has now filed a suit against Unocal.

Recreation Activities:

Damage resulting from 40 years of ORV use has been stabilized and conditions may have begun to improve. The State Recreational Vehicle Area (SRVA) is now fenced and monitored to prevent vandalism and excursions. Day use decreased 15% from 1989 to 1990. For all intents and purposes, ORV use outside of the SRVA, particularly south of Oso Flaco Lakes and in Santa Barbara County, has been eliminated. Revegetation projects during the last two winters are succeeding. More than 70 acres have been successfully revegetated north to northwest of Oso Flaco Lake. The area west of Oso Flaco, revegetated in 1985, continues to show positive progress. A State government botanist has implemented a new plan to slow sand erosion and revegetate the dunes. Several studies are ongoing in The Nature Conservancy (TNC) portion of the dunes to monitor and map rare plants, and monitor revegetation and exotic species.

ORV use is confined to 10% of the National Natural Landmark (NNL) and is rare outside the State Pismo Dunes riding area. The fenced riding area is maintained and patrolled. TNC maintains a staffed entrance station at the Mussel Rock Dune portion of the Guadalupe-Nipomo Dunes Preserve. The staff person helps ensure the preserve rules including restricting vehicles from off-road areas.

Grazing/Runoff:

One of the most serious sources of damage is grazing of cattle on private property in the wetlands area at the mouth of the Santa Maria River and in the dunes near Mussel Rock. Agricultural runoff continues to be a problem for Oso Flaco Lake, which receives most of its water supply from nearby agricultural fields.

Pipeline Construction:

The San Miguel Oil Pipeline environmental assessment has been released. The pipeline from platform "Julius" to shore has been approved by the State Coastal Commission. Four on-shore alternative pipeline corridors are now being evaluated. Product mix and phasing of delivery is likely to be changed, but on-shore impacts to the NNL will remain about the same; i.e., construction of a staging/transfer facility and installation of pipeline along a 100-foot-wide right-of-way through the dunes parallel to an existing pipeline. Depending upon pipeline route approval, up to 200 acres of dunes will be trenched. The project is on hold.

Sand Mining:

Incremental damage from excavation and processing at the Gordon sand pit continues. More serious damage has resulted from trespass and unauthorized ORV use. The project area is now entirely fenced and ORV damage no longer occurs. The action also contributed to curtailing ORV excursions into the entire southern portion of the NNL. Since completion of the fences, there has been noticeable natural regeneration of dunes in the immediate vicinity of the sand pit. Excavation and a small degree of damage from this activity will continue each year.

Land Acquisition and Related Activities:

The State Coastal Conservancy has purchased 2,500 acres owned by the Mobil Foundation, and transferred that property to TNC for inclusion in what is now know as the Guadalupe-Nipomo Dunes Preserve. TNC has completed preparation of a Guadalupe-Nipomo Dunes Preserve Management Plan for this 4,000 acre tract. This plan defines the restoration, access, and management goals and/or methods of implementation for the Mobil Coastal property, the 567-acre Mussel Rock Dune property, and an approximately 300-acre property that TNC is seeking an easement on. Such an easement could provide a public access connection between the Mobil Coastal property and the Mussel Rock Dune property and the 800-acre Oso Flaco natural area. TNC manages an additional 800-acre parcel directly north of the Mobil Coastal Preserve. The tract, owned by the Off-Highway Vehicle Division of State Parks and Recreation, was closed to off-road in 1982. TNC has a staffed entrance station here, has worked with the State Coastal Conservancy and volunteers to construct a foot bridge-boardwalk/trail, offer interpretive programs, and oversee research and monitoring activities.

The Santa Barbara County Land Trust was granted funds by the State Coastal Conservancy to write a management and acquisition plan for Point Sal. This document is a sister document to the Nipomo Dunes management plan.

The California Department of Parks and Recreation has signed a management contract with TNC for the Oso Flaco area. The area is now off-limits to ORVs and is one of the few wetlands remaining in the dunes. TNC is aiding in the management process.

California

Name: FISH SLOUGH Location: Mono and Inyo Counties

Ownership: Federal (Bureau of Land Management), State (California Department of Fish and Game), Municipal (Los Angeles Department of Water and Power), Private

Designation: May 1975 Section 8 Listing: 1993-1996

SIGNIFICANCE The site preserves a large and essentially undisturbed desert wetland with certain rare plant species. It also provides habitat for two native endangered fish species.

DESCRIPTION This 6,400-acre tract contains a wetland complex consisting of several springs, small streams, open ponds, and marshlands associated with Fish Slough, a tributary of Owens River. It is located in a high, warm, desert valley with the Sierra Nevada to the west and the White Mountains to the east. Spring flow into the marsh averages 6-9 cubic feet per second, with water depths throughout the area ranging from a few inches to 10 feet. A heavy growth of cattail and various bulrushes borders the ponds, along with a few scattered cottonwoods and willows. Certain rare plant species are also present. The ponds and marshes provide habitat for various wildlife, especially waterfowl and wading birds. The site is especially significant because it is the type locality of the Owens pupfish, an endangered species which was thought to be extinct until 1964. This species is found only in the Owens River drainage in Owens Valley. The Owens tui chub, also an endangered species, resides with the pupfish in a portion of the wetland protected from livestock grazing.

THREAT OR DAMAGE

Source Activities:
  grazing
Resource Impacts:
  VEGETATION: endangerment of rare species; degradation of wetland
Summary
  One rare plant species (*Astragalus lentiginosus* var. *piscinensis*), the Fish Slough Milkvetch, is being impacted by rabbit herbivory and cattle grazing. There is potential for changes in soil moisture. Wetland plant community quality is being impacted.

CURRENT SITUATION The section of Fish Slough owned by the City of Los Angeles Department of Water and Power (DWP) continues to be grazed. Although the DWP has established monitoring plots and exclosures to study the impacts of grazing on plant species which are candidates for Federal listing as threatened or endangered, grazing continues to pose a significant threat to these plants. This has been illustrated by the Fish and Wildlife Service's recent action to propose listing of one plant species located on DWP and BLM lands within the landmark as threatened or endangered due to its inherent rarity and susceptablility to stochastic events.

California

Name: SAN FELIPE CREEK Location: Imperial County

Ownership: Federal (Bureau of Land Management), Private

Designation: May 1974 Section 8 Listing: 1993-1996

SIGNIFICANCE The site represents one of the best examples of a natural desert stream and associated aquatic ecosystem remaining in the Colorado Desert.

DESCRIPTION The site includes a large aquatic ecosystem along the channels of San Felipe Creek and Carrizo Creek in the midst of the Colorado Desert. Both creeks emerge from springs in local sands and gravels and flow for approximately 3/4 mile before joining together to form a single stream. The main channel of San Felipe Creek disappears into the ground only about 1/2 mile beyond this junction. Extensive marshes occur along those stream channels, where rushes dominate along with tamarix, arrowweed, atriplex, and mesquite. Aquatic snails, frogs, and large populations of pupfish (*Cyprinodon macularius Californiensis*) inhabit the stream environment, while numerous birds and various mammals, such as coyotes and raccoons, frequent the site. Altitude of the site ranges from 60 feet to 155 feet below sea level. The area is underlain by recent lake deposit and to the north of the creek is a sand dune area.

THREAT OR DAMAGE

Source Activities:
- exotic species invasion
- visitor use

Resource Impacts:
- ECOSYSTEM: stress from competition with exotics
- degradation of wetland, channel alteration and current disruption

Summary

The site has been invaded by the exotic tamarisk plant, which competes with native plants.

CURRENT SITUATION The creek, like many in the lower Colorado Desert region, has become infested with dense stands of exotic tamarisk, compromising the biological integrity of the creek and associated wetlands. Vehicle closure signs have been established along the private/Federal/State boundaries. For 2-3 years, the Bureau of Land Management (BLM) has burned the tamarisk and cleaned out potholes. The BLM will continue monitoring and analysis to determine feasible and effective tamerisk control measures. Signing is intensifying and law enforcement officer attention continues. Selected vehicle barrier installation is being considered.

California

Name: TIJUANA RIVER ESTUARY **Location: San Diego County**

Ownership: Federal (Navy and Fish and Wildlife Service), State (Department of Parks and Recreation), San Diego County and City, Private

Designation: 1973 **Section 8 Listing: 1993-1996**

SIGNIFICANCE The site is influenced by both marine and river waters. Seven species of endangered birds, five of which are Federally listed, seasonally reside or nest within the Reserve. One plant which is federally listed as endangered is found within reserve.

DESCRIPTION Four biotic communities occur within the reserve: salt marsh, riparian, coastal sage, scrub, and sand dune. Property ownership within the National Natural Landmark includes: The U.S. Fish and Wildlife Service, Tijuana Slough National Wildlife Refuge (505 acres), California Department of Parks and Recreation, Borderfield State Park (418 acres), U.S. Navy (551 acres), San Diego County and City property (432 acres), private property (~600 acres). The Tijuana River Estuary is located between Imperial Beach California and the United States Mexico international boundary. The site is a part of the National Estuarine Research Reserve System under the National Oceanic and Atmospheric Administration (NOAA).

THREAT OR DAMAGE

Source Activities:

- sewage
- foot and vehicle traffic

Resource Impacts:

- WATER: degradation of water quality
- VEGETATION: impacts from foot traffic and vehicles

Summary

Approximately one million gallons of sewage and hazardous industrial material originating in Mexico are dumped into the river each day and flow through the Tijuana River. Large freshwater influxes change species composition in the seasonally marine dominated estuary. Construction of a sewage treatment facility is underway and should reduce this problem.

An increase in U.S. Border Patrol activities through operation "Gatekeeper" has dramatically reduced the impacts of foot traffic from undocumented immigrants on vegetation. Added disturbances to the resources are incurred due to border control measures which include 4x4 vehicles, helicopters, and boat activities within the reserve. Educational outreach programs have helped broaden understanding and cooperation.

CURRENT SITUATION An International Sewage Treatment Facility plant is currently under construction. Upon completion (1998), effluent will be released into the ocean three miles offshore. Excess effluent will be treated in Mexico. This should dramatically improve sewage treatment discharge problems in the Tijuana/US border area.

The International Boundary Water Commission has an intercept overland flow collector at Smugglers Gulch which reduces sewage flows into the estuary. A second collector is under construction at Goat Canyon. Although the number of days sewage runs into the river has decreased, water quality is poor and local beaches have been closed on numerous occasions.

Eroding sediment from development adjacent to the international border has resulted in the loss of eighty percent of the historic tidal prism in the last 100 years. The reserve staff, as well as researchers associated with the reserve, believe sedimentation is the greatest threat to the integrity of the Tijuana River Estuary. Reserve staff hope to have a sediment control basin constructed to reduce sedimentation of the estuarine habitat. Acquisition of privately owned coastal sage scrub along the border would benefit the reserve and afford protection of this habitat from development, degradation and disturbance.

The connector channel is the first of the three phase Tijuana River Restoration Plan, and should break ground in the fall of 1996. The channel is being constructed to connect the north arm of the estuary with the tidal ponds near the visitor center, thereby increasing tidal flow and decreasing sedimentation. The connector channel project will become the focus of educational programs at the visitor center.

Interagency cooperation within the reserve encompasses visitor center services and outreach activities that promote education and understanding of the resource in a local as well as international forum. An increase in education and outreach activities at the Estuary visitor center is correlated with increased public visitation last year. Outreach programs have increased awareness of the fragile resources within the estuary and resulted in more compliance with reserve regulations from local neighbors, visitors, and local agencies.

Colorado

Name: RUSSELL LAKES **Location: Saguache County**

Ownership: Federal (Bureau of Reclamation), State (Colorado Division of Wildlife), Private

Designation: May 1975 **Section 8 Listings:** 1978, 1989, 1992-1996

SIGNIFICANCE The site represents one of the few remaining large, high-altitude, alkaline marshes in the southern Rocky Mountains. It is the most extensive bulrush marsh in Colorado. There are impressive numbers and diversity of flora and fauna. It is an outstanding resting and breeding habitat for waterfowl.

DESCRIPTION This 3,860-acre site is situated in San Luis Valley, the highest and most southern of Colorado's four large intermountain valleys. There are five large lakes and numerous smaller lakes and ponds. The larger lakes are fed by natural springs, but are augmented by irrigation water and artesian well inflow. One hundred bird species have been recorded here. The landmark tract consists of approximately 300 acres of open water, 1,600 acres of marshland, and 1,900 acres of native grassland. The remainder is upland saltgrass and greasewood pastureland.

THREAT OR DAMAGE

Source Activities:
- potential alteration of water table
- trespass cattle grazing

Resource Impacts:
- ECOSYSTEM: potential drying of wetland, trampling of nesting sites

Summary

In the late 1980s, a development company filed a claim for 50,000 acre-feet of water to be taken from deep wells located to the east of Russell Lakes. If completed, it could have resulted in the loss of the artesian head within a few years and eventual drying up of the Russell Lakes complex.

CURRENT SITUATION The Colorado Division of Wildlife (CDW), along with several other agencies, including the Bureau of Reclamation (BOR), the National Park Service, the Bureau of Land Management, and the Fish and Wildlife Service, filed objections to the water claim of American Water Development, Inc. (AWDI). AWDI withdrew its claim for tributary water a week before the trial began in early October 1991, because it could not show what it was going to do with the water, a requirement under Colorado law. Evidence was presented by experts from both sides on the geology of the valley and the suspected effects of pumping from a deep aquifer beneath the valley on agriculture, wetlands, and the Great Sand Dunes National Monument. On November 22, 1991, the judge ruled against AWDI's non-tributary claim. The decision was appealed to the Colorado Supreme Court.

The U.S. Supreme Court refused to hear the water case on Monday, November 28, 1994, and the case has been concluded. The company's plan would not only have affected Russell Lakes, but according to one expert it would have lowered the water table 2-3 feet and seriously impacted Great Sand Dunes National Monument. The AWDI property has been sold and a new but similar water development concept has been discussed which could impact the aquifer which underlies the Russell Lakes site.

The Stockman's Water Company is expected to file in the winter of 1996 or spring of 1997 for the rights to market groundwater and surface water. The impacts could be similar to the AWDI claim.

The CDW completed construction of fences to keep trespass cattle out of the preserve. Cattle have damaged waterfowl nesting areas in the past. The CDW is planning public facilities in such a way that will preserve the Russell Lakes and protect nesting waterfowl. Development is supported by Federal funds managed by the

Colorado Division of Wildlife, through a contract with the BOR. The plans for the short trail system in the southwest area of the preserve are underway. Part of the trail was developed in May 1995, and another portion was built in August 1996 by Volunteers for Outdoor Colorado. The trail is not yet complete. Interpretive information will be developed for the site. The Bureau of Reclamation is having discussions with AWDI.

The land that was being considered for the land exchange between landowners and the Rural Economic and Community Development Agency was recently sold to another private individual. However, another land exchange between landowners and the Colorado Wetlands Partnership (Ducks Unlimited), with grant funds, is now being considered.

Florida

Name: BIG CYPRESS BEND Location: Collier County

Ownership: State (Department of Natural Resources)

Designation: October 1966 Section 8 Listings: 1988-1989, 1992-1996

SIGNIFICANCE The site includes about 215 acres of undisturbed virgin cypress.

DESCRIPTION The 650-acre site contains cypress, sawgrass prairie, and palmetto hammocks. Many cypress are as much as 100 feet tall and 4-5 feet in diameter. Some royal palms are present.

THREAT OR DAMAGE

- Source Activities:
  - water diversion
- Resource Impacts:
  - WATER: potential alteration of water table hydrological regime
  - VEGETATION: invasion of exotic species
- Summary
  - The alteration of wetlands north of Big Cypress and the extraction of groundwater both for residential development and agricultural irrigation could have a negative impact on the site over the long term by changing the regional hydrology. Ecosystems in this region are dependent on seasonal variations of water in the proper quantities.

CURRENT SITUATION Exotic species encroachment, including Australian pine and Brazilian pepper, has begun around the edges of the national natural landmark. The State has an active exotic species removal program, and has met with the South Florida Water Management District to finalize long-range plans for the area. All county, State, and Federal agencies involved are concerned about exotic species invasions and are cooperating on solutions. The site is contained within Fakahatchee Strand State Preserve. Acreage north of U.S. 41 will be purchased by the State. As a result of PL 100-696 (the Arizona-Idaho Conservation Act of 1988), acreage south of U.S. 41 is authorized for land exchange, which should bring it under Fish and Wildlife Service administration. Exotic plant threats will continue because they originate outside this acreage.

The Faka-Union Canal system was constructed to reduce flooding in a planned residential tract called the Golden Gate Estates. The northern portion of Golden Gate Estates is under development, but the south portion is relatively undeveloped. The Army Corps of Engineers has investigated alternative methods of restoring historic water conditions and has developed a plan for restoring the natural hydrology of the area. The U.S. Army Corps of Engineers has determined flood damage reduction benefits were not sufficient when compared to costs to develop Federal participation in the plan. The Corps indicates the plan provides conceptual information which could be used by state and local interests in determining long term solutions to local water and land resources management problems within the basin.

Florida

Name: PAYNES PRAIRIE **Location:** **Alachua County**

Ownership: State (Department of Environmental Protection), Private

Designation: December 1974 **Section 8 Listings:** 1977-1989, 1993-1996

SIGNIFICANCE This site contains the largest and most diverse freshwater marsh or wet "prairie" in northern Florida. The area is further characterized by karst topography and contains the Alachua Sink, one of the largest and most significant sinkholes in Florida. The site is also a major inland wintering ground for waterfowl in the Florida Peninsula and provides habitat for numerous other wildlife species, including the American alligator and southern bald eagle.

DESCRIPTION This 14,000-acre site contains an extensive, flat limestone basin vegetated primarily by freshwater marsh, or wet "prairie." A large lake in the center of the prairie, Alachua Lake, tends to fluctuate in size and is drained by Alachua sink on the northern border of the tract. Disturbed live oak hammock forest, interspersed with a diversity of other species, surrounds the prairie on nearly all sides.

THREAT OR DAMAGE

Source Activities:
- urban encroachment
- diversion of natural water inputs
- stormwater discharge
- treated wastewater effluent discharge
- bisection by two major roadways
- encroachment of utility easements
- fire control requirements due to proximity to urban area

Resource Impacts:
- WATER: low water levels due to diversion; surface water flows impeded by roadways; water quality impacts associated with urbanization, stormwater discharges, and wastewater effluent discharge.
- VEGETATION: successional changes are on-going, with vegetation generally shifting from freshwater marsh species to woody herbaceous shrubs in various portions of the site.

CURRENT SITUATION Urban encroachment on Paynes Prairie is continuing. An allocation of water from Prairie Creek to Paynes Prairie has been made by a regional water management district to ensure that approximately 45% of the flow of Prairie Creek flows to Paynes Prairie. Stormwater discharges and the discharge of treated wastewater effluent containing nutrients and high sediment continue into Sweetwater Branch, into a canal on Paynes Prairie, and ultimately to Alachua Sink. Exotic plants invaded one part of the marsh where effluent deposition occurred until about 12 years ago. Two major highways bisect the area and interrupt the sheet flow of water. A major input stream has been dammed and a canal dug to direct flow away from the landmark. Review and comments were provided by the State during the regulatory review process to minimize impacts on vegetation and wildlife by utility corridors. The Florida Department of Environmental Protection, St. Johns River Water Management District, and Gainesville are jointly developing a plan of study to model prairie vegetation and predict responses to varying hydroperiod, fire frequency, and nutrient levels.

Florida

Name: REED WILDERNESS SEASHORE SANCTUARY Location: Martin County

Ownership: Federal (Fish and Wildlife Service)

Designation: November 1967 Section 8 Listings: 1986-1989, 1992-1996

SIGNIFICANCE This semi-tropical site is one of the few remaining unaltered examples of Atlantic beach coast along the Florida seaboard. It provides habitat for numerous animal and plant species characteristic of beach, shell mound, and mangrove swamp communities and is an important nesting site for the endangered Atlantic green and threatened leatherback and loggerhead sea turtles.

DESCRIPTION A 320-acre seashore composed of bays, lagoons, islands, and beach areas within Hobe Sound National Wildlife Refuge.

THREAT OR DAMAGE

Source Activities:

- invasion of exotic plant species
- beach erosion

Resource Impact:

- VEGETATION: alteration of native species composition

Summary

Exotic plants, including Australian pine (*Casuarina equisetfolia*) and Brazilian pepper (*Schinus terebinthifolius*), are invading the mangrove swamps and the beach from adjacent land. The number of Australian pines on the refuge is estimated to be one to two million plants, including approximately one-half million trees and seedlings in the landmark area. Exotic plant species were introduced with the spoil material placed in the area before landmark designation.

The mangrove swamps remain vulnerable because they are surrounded by trees that are sources of new pest seeds. In addition, the exotics may contribute to the erosion of the beach, which has been eroding at 10 to 15 feet per year, because they hinder establishment of native beach-stabilizing grasses. They are also incompatible with the threatened and endangered marine turtles' nesting requirements.

CURRENT SITUATION The Fish and Wildlife Service is focusing its management efforts on the beach area in order to maintain the nesting habitat of the threatened and endangered turtles. Refuge managers have removed 75% of the exotic seed trees from the beach. Spoil material from maintenance dredging of the St. Lucie Inlet was placed on Jupiter Island to mitigate beach erosion. Natural sand movement has been restricted by a jetty north of the St. Lucie Inlet. Accelerated beach erosion may have resulted from the closing of a natural inlet by a previous owner.

Georgia

Name: EBENEZER CREEK SWAMP **Location: Effington County**

Ownership: Private (multiple)

Designation: May 1976 **Section 8 Listing: None**

SIGNIFICANCE The best remaining cypress-gum swamp forest in the Savannah River Basin.

DESCRIPTION This 1,350 acre tract occupies the floodplain of Ebenezer Creek, a tributary of the Savannah River. Old growth bald cypress and tupelo gum are common in this natural and relatively undeveloped area.

THREAT OR DAMAGE

Source Activities
- development in the watershed
- regulation of water levels in the Savannah River (point and non-point)
- wastewater and nutrient influx

Resource Impacts
- eutrophication

Summary

The swamp is exhibiting typical signs of eutrophication (i.e., nutrient enrichment) such as fish kills and excessive blooms of aquatic weeds.

CURRENT SITUATION Development of the Ebenezer Creek watershed has accelerated in recent years as a result of expansion of the Savannah metropolitan area. In addition, regulation of water levels in the Savannah River by upstream reservoirs has reduced differences between maximum and minimum river flows, presumably resulting in decreased seasonal flushing of nutrients and sediments in Ebenezer Creek. The city of Springfield, Georgia, has been discharging treated wastewater into Ebenezer Creek.

In 1993 the Georgia Department of Natural Resources, in collaboration with the University of Georgia, the Georgia Conservancy, and others, began a watershed-based study of Ebenezer Creek. After completion in August 1996, workshops will be conducted to develop a consensus on what actions are needed to better protect the Swamp.

Hawaii

Name: MAKALAWENA MARSH **Location: Island of Hawaii**

Ownership: **Private**

Designation: **June 1972** **Section 8 Listing: 1994-1996**

SIGNIFICANCE One of two ponds in Hawaii that harbor the endangered Hawaiian stilt.

DESCRIPTION: This 165-acre NNL contains the 12-acre brackish-water Opaeula Pond. The pond contains series of islets and is bordered by lava flow and outcroppings. The wall remains of an ancient Hawaiian fish pond are found beneath the pond surface.

THREAT OR DAMAGE

Source Activities:
- natural succession
- exotic species

Resource Impact:
- ECOSYSTEM: potential loss of some species

Summary

Natural succession and exotic species threaten the bird populations.

CURRENT SITUATION Feral goats enter the area and graze. Mongoose are being trapped by the State, but their population seems stable. Both are injuring the bird populations. The pond is being overtaken by natural succession, which in ten years could eliminate the pond. Illegal grazing continues in the area. The State would like to lease and manage the land.

Hawaii

Name: **KANAHA POND** **Location:** Island of Maui

Ownership: State (Department of Transportation)

Designation: June 1971 **Section 8 Listing:** 1994-1996

SIGNIFICANCE The site harbors two endangered bird species: the Hawaiian stilt and Hawaiian coot, more than any other place on the island. It is one of the most important water bird habitats in Hawaii. The area is home to at least three endangered plant species.

DESCRIPTION The total acreage of the NNL is 143 acres. The irregularly-shaped twin ponds were constructed over two hundred years ago as fish-rearing ponds. This water-bird sanctuary includes about 80 acres of water surface. The land area has grown to 155 acres of surrounding land.

THREAT OR DAMAGE

Source Activities:
- exotic species invasion

Resource Impact:
- ECOSYSTEM- potential species loss

Summary

The wetlands are suffering from exotic species invasion and water flow disruption. The area is being managed to control alien plants.

CURRENT SITUATION The Hawaiian Native Plant Society is weeding out exotic species and planting native ones, after consultation with the USGS-BRD Haleakala Field Station. Feral cats and mongoose are being trapped by the State. The endangered Hawaiian stilt population is increasing, assisted by State-constructed artificial islands and platforms.

There have been calls for airport expansion into the NNL, raising the concern of local environmental groups. The U.S. Department of Transportation (DOT) turned the property over to the State after World War II.

Water flow to the sea sometimes backs up due to channel overgrowth and sand bar deposition, creating a threat to nesting birds in the ponds. The channel is cleared of vegetation on a yearly basis (twice a year when funding allows). The area is subjected to illegal trash dumping.

Idaho

Name: HAGERMAN FAUNA SITES Location: Twin Falls County

Ownership: Federal (National Park Service), State (Department of Parks and Recreation)

Designation: May 1975 Section 8 Listings: 1977-1989, 1992-1996

SIGNIFICANCE The site contains the world's richest known deposits of Upper Pliocene terrestrial fossils and therefore is considered to be of international significance.

DESCRIPTION The 3,875-acre tract contains fossil exposures in about 550 feet of stratigraphic section within the hills and cliffs bordering the west bank of the Snake River. The landmark site is located within Hagerman Fossil Beds National Monument.

THREAT OR DAMAGE

Source Activities:

agricultural irrigation

Resource Impacts:

FOSSIL RESOURCES: erosion of exposures and structural disturbance of stratigraphy

Summary

Accelerated soil movement caused by surface-water runoff from irrigated farmlands on the plateau above and west of the river canyon and discharge from springs and seeps along steep, east-facing slopes continues to erode the fossil beds. Gullies have formed in a large portion of the site, and fossils have been washed away. Large slump areas caused by subsurface soil saturation are another visible evidence of erosion and likely will continue to disrupt fossiliferous strata, as long as artificial seeps remain active. More than 100 acres have now been disturbed as a result of major landslides in 1983, 1987, 1989, and 1991. Because earthflow movement disrupts local stratigraphy, the scientific and educational value of areas affected has been considerably diminished.

The principal sources of surface water runoff are excess irrigation water and the periodic flushing of sprinkler valves. The source of the seeps is a perched aquifer, which is probably recharged by seepage losses from an irrigation canal near the canyon rim and is supplied by water pumped from the Snake River. However, the precise nature and extent of the perched aquifer is unknown.

CURRENT SITUATION About 20 acres of one section is currently being farmed by private interests under an expired Bureau of Land Management (BLM) land use permit. The permit was granted to allow agricultural use of Federal land in exchange for non-use of private farmland outside the boundaries that was having adverse impacts on national park resources in the form of irrigation runoff and erosion. The BLM and the National Park Service plan to contact the private interests to try to mitigate agricultural impacts within the landmark and the park.

The fossil sites continue to erode. The 1991 slide is the first recorded mass movement associated with the lower pump station and canal system located at Fossil Gulch. A large slump further north and to the west, and gully formation from seeps, occurred about 1984. The 1991 slide, which is 5 acres in size, is located approximately 500 yards northeast of the Horse Quarry and poses a serious threat to the site. The movement of fossils constitutes an irreversible impact due to strata displacement.

Idaho

Name: MENAN BUTTES Location: Madison and Jefferson Counties

Ownership: Federal (Bureau of Land Management), Private

Designation: February 1980 Section 8 Listing: 1993-1996

SIGNIFICANCE The site contains outstanding examples of glass tuff cones, which are found in only a few places in the world. Menan Buttes were erupted through the saturated alluvium of the Snake River Valley and the erupted lava was chilled suddenly to form a basaltic glass, which disrupted into small particles that form these huge tephra cones. Their large size and unusual composition make these buttes particularly illustrative of an unusual aspect of basaltic volcanism.

DESCRIPTION The area consists of five volcanic cones which erupted along a north-south trending fissure, but only the three best preserved cones of the five are included within the 3,800-acre landmark tract. The highest of the cones rises 800 feet above the floodplain of the Snake River Plain, near the confluence with Henrys Fork. The largest buttes are probably not more than 10,000 years old. Eruptions were of a highly explosive nature owing to molten magma coming in contact with water at or near the surface. The buttes are truly "glass mountains." They are composed of small fragments of basaltic glass formed by sudden chilling of magma. The highest point on the crater rims is on the northeast side of the vents. Wind erosion since production of the volcanic tuff has carved pillars, caves, channels and large circular basins, particularly on the southwest side of North Menan Butte.

THREAT OR DAMAGE

- Source Activities:
  - off-road vehicle (ORV) use
- Resource Impacts:
  - GEOLOGIC RESOURCES: soil erosion
- Summary
  - A network of ORV roads has significantly affected the surficial geology (i.e., soils) of the butte with resultant soil erosion.

CURRENT SITUATION ORV use is the principal source of resource impacts on North Menan Butte. The Bureau of Land Management (BLM) recognizes the problem and has closed North Menan Butte to ORV use. North Menan Butte is an Area of Critical Environmental Concern and a research natural area.

Private lands on the lower slopes of the south and east sides of the North Menan Butte are now being developed into homesites. While this building activity has distracted from the natural setting of the area, homes have been built adjacent to several old access roads which have been closed or obliterated. As a result, unauthorized ORV use of the eastern part of the north butte has been eliminated. In addition, the BLM has strengthened the road closure on the west side of the north butte and concentrated patrols in that area, resulting in less use of the butte by ORVs.

Design is ongoing to develop a parking lot on BLM land on the south side of the north butte and a system of trails that will increase accessibility yet greatly reduce erosion on the butte. BLM anticipates this effort will be completed in 3 to 5 years. The area continues to get an extraordinary amount of use by school groups, from grade school to college age youth.

Illinois

Name: HERON POND-LITTLE BLACK SLOUGH NATURAL AREA Location: Johnson County

Ownership: State (Department of Natural Resources), Private

Designation: March 1980 Section 8 Listings: 1980, 1984, 1989, 1993-1996

SIGNIFICANCE Little Black Slough, Heron Pond, and Wildcat Bluff together contain some of the best remaining examples of vegetation types at the western margin of the Interior Low Plateaus, including tupelo-cypress swamp, maple-oak forest, mixed hardwood forest, and limestone glades. The site contains the largest remaining tupelo-cypress swamp in Illinois and in many respects is a small wilderness. In addition, it harbors a number of rare animal species.

DESCRIPTION This 6,315-acre area contains one of the largest tupelo-bald cypress swamps in Illinois, a remnant of the vast cypress swamp once found in the southern part of the State. Little Black Slough contains three major types of virgin forest: deep swamp and bottomland, dominated primarily by water tupelo and bald cypress; a mixed hardwood forest on Boss Island, the Boulder Slope, and a limestone glade on Wildcat Bluff 180 feet above the swamp. The valley itself is part of an entrenched, meandering stream system, which contains examples of alluvial, colluvial, and lacustrine sedimentation.

THREAT OR DAMAGE

Source Activities:

stream channelization and diversion

Resource Impacts:

WATER: potential lowering of water table

VEGETATION: potential alteration of native species composition

Summary

Diversion and channelization of the Upper Cache River has caused stream entrenchment and riverbank erosion near the site. As a result, gullies extending from the eroding bank of Cache River toward Heron Pond, located only 20-40 feet away, threaten the pond. Piping occurring from the pond into the river has lowered the pond's water level.

CURRENT SITUATION At the request of the Department of Natural Resources, the Army Corps of Engineers considered rehabilitation of the abandoned U.S. Geological Survey gaging station, just downstream from the natural area, to attempt to inhibit further streambank erosion and river entrenchment there. That study was completed in 1986 under the authority of Section 14 of the 1946 Flood Control Act, as amended, and has been reviewed. A 1986 policy interpretation by the Army, however, determined that Section 14 authority does not apply to Heron Pond, because it is a wetland and not a structure. Accordingly, the Corps will pursue no further study of protection of Heron Pond under Section 14 authority. The Corps has received general authorization for a separate Feasibility Study of the Cache River Basin, however, including the Heron Pond-Little Black Slough Natural Area, which will focus on siltation, drainage, and flooding problems.

A study of the Department of Natural Resources will determine the best method of stopping the entrenchment. A master plan for this site was recently approved. The Department of Natural Resources placed stone in the gullies as a temporary measure to control erosion.

Illinois

Name: LOWER CACHE RIVER SWAMP Location: Johnson and Pulaski Counties

Ownership: State (Department of Natural Resources), Private

Designation: March 1980 Section 8 Listings: 1980, 1981, 1984-1989, 1993-1996

SIGNIFICANCE Lower Cache River Swamp is an outstanding remnant of the swampy floodplain forest and open swamp that once covered an extensive area at the junction of the Mississippi and Ohio River Valleys. The tract lies at the northern range edge of many southern plants and animals and contains many large trees. As of August 1991, there were seven state champion tree species and two national champion tree species. No comparable area of large cypresses and water tupelos is known in Indiana, Kentucky, Missouri, Arkansas, or Tennessee.

DESCRIPTION This 1,250-acre tract of wet forest and swamp is 1/4 to 1/2 mile wide and extends for 5 miles along the Lower Cache River. Much of the site is dominated by water tupelo and bald cypress. Although timber has been harvested from the better-drained portions of the landmark, the swampy forest contains many unusually large, old trees. The Cache River occupies an underfit stream valley carved by glacial outwash drainage.

THREAT OR DAMAGE

Source Activities:
- stream channelization and diversion
- erosive farming methods

Resource Impacts:
- WATER: increased siltation, altered hydrological regime, farm chemical pollutants
- VEGETATION: potential alteration of native species composition

Summary

Diversion and channelization of the major tributaries of the Lower Cache Swamp has made it a settling basin. Increased siltation is resulting, which in time will replace the swamp with dry land.

CURRENT SITUATION The Illinois Department of Natural Resources has initiated litigation to assume responsibility from the local drainage district for maintenance of the drainage ditch near the Lower Cache Natural Area. Cypress Creek National Wildlife Refuge and The Nature Conservancy (TNC) have purchased about 7,000 acres in the swamp watershed; 2,500 acres have been reforested so far. TNC and the Natural Resources Conservation Service cosponsor a watershed resource planning initiative to stem erosion on private farmland. The U.S. Army Corps of Engineers is doing a 2-year feasibility study on how to restore the hydrology of the Cache River wetlands; reduced siltation is a major goal.

Illinois

Name: MARKHAM PRAIRIE **Location: Cook County**

Ownership: **Private**

Designation: **November 1987** **Section 8 Listings: 1989, 1992-1996**

SIGNIFICANCE This is one of the largest and highest quality prairies in Illinois and in large parts of adjacent states. As a transitional prairie intergrading between sand prairie and typical tall grass prairie on loamy soil, it is a remnant of a distinct and formerly widespread biotic community type. It is also an example of undeveloped lake bed and beach ridge topography, which has been totally eliminated along the south edge of Lake Michigan, where most mesic prairie survived.

DESCRIPTION The ecological communities here can be broadly categorized as mesic prairie (about 2/3) and sedge meadow (about 1/3). Markham Prairie sits on the Chicago Lake Plain which is composed of unconsolidated sediments. Prairie on loam and clay predominates in the tall-grass prairie region from the Great Plains states to Ohio; but sandy prairie soils occur along streams, in glacial plains, and in glacial lake beds. The fauna include 350 species of insects, 13 reptiles and amphibians, 21 nesting birds, and 12 mammal species. The southern portion contains a population of the Federally threatened white-fringed orchid (*Habenaria leucophaea*).

THREAT OR DAMAGE

Source Activities:

commercial construction

Resource Impacts:

ECOSYSTEM: destruction by human activity

Summary

The southern one-third of this prairie landmark is threatened by commercial development. The prairie is already a habitat island, and further development adjacent to the landmark will lessen its viability by making immigration of non-volant individuals from adjacent similar habitat less likely. This leads to smaller population sizes which could result in species loss.

CURRENT SITUATION A new exchange ramp is being built from the Tri-State Tollway to 159th Street which will give southbound traffic access to 159th Street. This will make the southern portion of the area more available for commercial development. There are also secondary problems resulting from the proximity of residential development such as dumping and gardening. This can ultimately reduce or degrade the prairie.

Private interests have drawn up plans to develop 40 acres at the south end of the site, a two-phase plan which includes a motel and office buildings. The town of Markham had designated part of the national natural landmark (NNL) as a special tax zone to encourage development. These plans were presented to the Markham Planning Commission and the Markham City Council in May 1990, both of which gave their tentative approval. As the NNL is considered a wetland, the U.S. Army Corps of Engineers (Corps) has regulatory authority over the discharge of dredged or fill material into the wetland. The Corps has completed a wetland delineation in the proposed development area and has deemed it 50% "high quality wetland." The Corps has notified the developer that any fill material that is placed in wetlands will require a Department of the Army permit. The developer has received letters from the Corps and the Illinois Department of Conservation urging protection of the northern 20 acres. The Fish and Wildlife Service (FWS) is supporting the Corps position. Later, the Corps and the FWS declared that 60% of this land cannot be built upon. This matter is currently in litigation. The battle over development in the southern portion of the NNL continues.

Two species of European buckthorn are being cut and herbicided. Canadian thistle is being herbicided. Twenty percent of the preserve was burned in the Fall if 1994 and an additional 10% burned in a wildfire in the Spring of 1995. A wildfire took place on May 23. 1996, burning 320 acres of the landmark. The portion of fence located adjacent to a residential area, missing last year, has been repaired.

Illinois

Name: VOLO BOG NATURE PRESERVE **Location: Lake County**

Ownership: State (Department of Natural Resources)

Designation: February 1973 **Section 8 Listings:** 1977-1980, 1982, 1984, 1986-1989, 1992-1996

SIGNIFICANCE Volo Bog exhibits the characteristics of northern bogs near the southern limit of their occurrence and is in excellent condition. Because few bogs occur in Illinois, this site contains many plants that are unusual or rare in the State.

DESCRIPTION Volo Bog is characteristic of the classic northern quaking bog. An area of open water is located at the center surrounded by cattails and giant bur-reed. The sphagnum mat is well developed and extends back from the open water some distance, where it forms the substrate for the surrounding tamaracks and shrubs, such as poison sumac and winterberry.

THREAT OR DAMAGE

Source Activities:
- invasion of exotic plant species
- potential highway construction
- adjacent development
- beaver population

Resource Impacts:
- WATER: lowering of water table
- VEGETATION: potential alteration of native species composition

Summary

There is ongoing and proposed development adjacent to the site. The manager of the adjacent residential development has also dug a ditch in an attempt to lower the lake level, which would make dredging operations less expensive. As a result, the lake has already dropped 2 feet, and the manager of the adjacent property hopes to lower it another 2 feet. This could also drop the water level in the bog, with serious effects on bog vegetation. Two exotic plant species have invaded the bog. A gravel pit is now in operation east of the bog. Once mined, low-density homes will be built in that area. There is a proposal to build an asphalt plant approximately one mile east of the preserve. These activities could affect the water table and increase potential visitor impacts.

CURRENT SITUATION Exotic buckthorn continues to be a threat and purple loosestrife continues to move into the area. The water level in the bog is being manipulated and monitored in an effort to raise it to its natural level, and hopefully thereby reduce the spread of smooth buckthorn. A new floodgate has been installed to control the water level. Hand removal of purple loosestrife and spraying the herbicide, Rodeo, is underway. No burning is done in the inner zone. The marsh area has not been burned in approximately four years. The potential of a drop in water level in the bog due to external development is being monitored. The beaver population is causing problems in water level maintenance. The proposed highway project (FAP420), the Richmond Expressway, which could threaten the entire national natural landmark if constructed, has reportedly been rerouted, but this decision is not final.

Mining within the bog still occurs and there are plans to drill a well between the bog and the developed land. The new well, along with a 30 acre lake being donated by area contractors, will enable management to test and monitor groundwater in and around the bog.

A concrete mixing operation is in an adjacent gravel pit and the owner is attempting to attain special use zoning from Lake County. Buckthorn was herbicided. A prescribed burn was done on the marsh surrounding the bog in 1995. A new floating, wooden boardwalk was created on the main trail where none previously existed.

Illinois

Name: WAUCONDA BOG NATURE PRESERVE **Location: Lake County**

Ownership: County

Designation: February 1973 **Section 8 Listings:** 1988-1989, 1992-1996

SIGNIFICANCE Wauconda Bog is a mature fen in very good condition. It appears to be the furthest southern appearance of bog or fen vegetation in Illinois, and consequently represents an unusual biotic community for the region.

DESCRIPTION The bog (actually a fen due to almost neutral to alkaline pH) occurs within the limits of the Valparaiso moraine. The site represents a fen community in a mature state and has no open water. It illustrates bog succession, and is a mixture of trees, shrubs, and herbaceous plants.

THREAT OF DAMAGE

Source Activities:
- invasion of exotic plant species
- adjacent development

Resource Impacts:
- VEGETATION: potential alteration of native species composition
- WATER: potential alteration of water table

Summary

The area has been invaded by two exotic plants, purple loosestrife and smooth buckthorn. Herbicides are being used, but their effectiveness has yet not been determined. In addition, the deer population is increasing, and overbrowsing may soon also negatively affect the bog plant community. The entire national natural landmark is ringed by single-family residential homes, which could influence the hydrology of the bog by altering the water table.

CURRENT SITUATION A monitoring program is being established for threatened and endangered species. Existing programs include the monitoring of showy ladies slipper, yellow birch, and tamarack. Plans exist for burning a portion of the bog in the Fall of 1996.

About one thousand purple loosestrife leaf-eating beetles were released. They survived the winter and appear to be spreading. A *Hylobius* weevil will also be released to control purple loosestrife.

Indiana

Name: HOOSIER PRAIRIE **Location: Lake County**

Ownership: Federal (National Park Service); State (Department of Natural Resources)

Designation: August 1974 **Section 8 Listings:** 1978-1979, 1992-1996

SIGNIFICANCE Hoosier Prairie is the last large tract of prairie near the eastern margin of the "Prairie Peninsula." It contains a great diversity of community types, and almost 300 vascular plant species have been identified, at least 43 of which are uncommonly or rarely encountered in Indiana. Its location within a heavily populated and industrialized region makes it particularly valuable for educational and nature-viewing pursuits and is within the boundary of Indiana Dunes National Lakeshore.

DESCRIPTION This 330-acre prairie site has a substrate consisting primarily of glacial outwash, plus some lacustrine and beach deposits that have been reworked by wind into a series of gentle, low dunes, intermixed with depressions. Only about 10 feet of relief occurs on the tract. The vegetation is actually a mixture of cattail marsh, wetland prairie of various types, dry prairie, and a mosaic of shrubby prairie and oak-prairie savanna. Seven different community types, which range along the moisture gradient from cattail marsh to black oak savanna, were mapped in a 90-acre area.

THREAT OR DAMAGE

Source Activities:

- proposed highway widening
- adjacent wetland filling

Resource Impacts:

- VEGETATION: elimination

Summary

This fragile prairie remnant is endangered by the possibility of a road widening. This planned corridor would go directly through the national natural landmark (NNL).

CURRENT SITUATION There is a possibility that Main Street, in parts of the towns of Griffith, Highland and Schererville, will be widened from Griffith to nearly the Illinois state line. The existing Main Street is a two-lane east/west local road that passes through the NNL within a 60-foot right-of-way. The widening is to relieve traffic congestion on I-94 and U.S. 30.

Highland initiated a study in April 1991 to improve a short section of Main Street from Indianapolis Road (US-41) to Kennedy Avenue. Subsequent to the preparation of an Environmental Assessment on February 24, 1994, a "finding of no significant impacts" (FONSI) was prepared on August 29. Shortly after the April 1991 Highland Study was initiated, the Towns of Munster, Dyer, Highland, Schereville, and Griffin jointly initiated a second Main Street study analysis from Dyer Road, in the town of Dyer, to Colfax Road East, in the Town of Griffin. For this second Main Street project to upgrade to four lanes, an environmental assessment was also prepared. This proposed project was coordinated with Illinois. Approximately 2.3 miles would be in Indiana and 3 miles would be in Illinois. The environmental impacts on the prairie were addressed in the environmental assessment approved for distribution September 14, 1992. In response to the document, the resource agencies stressed their concerns about the project's affect on the prairie. They also questioned the reasons for extending the corridor from I-349 to I-65 to relieve traffic on I-80/94.

These proposals are being studied and designed by a consulting firm. Their environmental study has been processed through the Indiana Department of Transportation and the Federal Highway Administration (FHA). The FHA approved it on September 14, 1992. In February 1993, the National Park Service reviewed the document and asserted that the study report was inadequate. The Environmental Protection Agency's (EPA) Region 5 instigated a meeting with the FHA Region 5 on September 19, 1994.

On May 3, 1993, the FHA met with the Indiana Department of Transportation (INDOT) to address the concerns raised by the resource agencies. The FHA advised the INDOT that an expanded environmental analysis would be necessary as a precondition to providing Federal funding for the Main Street project. To date, no such expanded analysis has been transmitted to EPA for review. The INDOT did advise the towns that further corridor evaluation for what is proposed between Dyer Road and Colfax Street will be needed, and more detailed evaluation of possible impacts on the prairie will also be required. Until these issues are resolved, a record of decision cannot be prepared.

There is a secondary concern other than the proposed highway project. A development corporation illegally filled a wetland immediately north and adjacent to the NNL. Violations began in 1987. The State asked the EPA to expedite any and all jurisdictional procedures to bring this matter to settlement. The EPA referred this matter to the Department of Justice for litigation on September 7, 1993. Wetlands protection staff in EPA Region 5 have worked to ensure that the case files for these violations are ready for use in court. The EPA is prepared to testify in Federal District Court in support of vigorous enforcement of Section 404 of the Clean Water Act, should the case go to trial. EPA has ongoing discussions with the Department of Justice for purposes of identifying the most appropriate strategy for bringing this issue to closure. The case is scheduled for an administrative hearing on November 26-29, 1996, regarding a $125,000 penalty action. EPA is encouraging the violator to settle this by means of restoration and/or mitigation alternatives.

Buckthorn and purple loosestrife continue to be herbicided. In the Spring of 1995, 105 acres was burned and 75 acres will be burned in the Spring of 1996. An underground drilling approach conducted by a private company doing mining disturbed less than 1/2 acre, instead of over four acres predicted using conventional drilling. The site was reseeded using native prairie grasses. Another private company, located adjacent to the prairie, withdrew their plans to erect four new storage tanks.

Indiana

Name: KRAMER WOODS Location: Spencer County

Ownership: Private

Designation: November 1973 Section 8 listings: 1992-1996

SIGNIFICANCE The site is one of only two relatively large, presettlement, lowland mixed forest remnants left in Indiana, and is probably one of the best remaining in the Midwest. It is the only Shumard's red oak-pin oak-hickory dominated stand of any size remaining in Indiana.

DESCRIPTION This 220-acre forested tract covered with poorly-drained soils supports a superlative wetland forest dominated by Shumard's red oak, shellbark hickory, pin oak, and sweetgum. The average tree size of 14.6 inches diameter at breast height (dbh) is one of the largest in Indiana. There is a great number of large trees, including swamp white oak (56 inches dbh), Shumard's red oak (50 inches dbh), and pin oak (42 inches dbh). Thirty-three tree species contribute to the canopy stratum, twenty-four species were found in the shrub layer, and thirty-six species were reported in herbaceous stratum. A better-drained ridge in the south-central part of the site supports a beech-dominated mesic forest, and there are low areas formerly heavily dominated by American elm and slippery elm.

THREAT OR DAMAGE

Source Activities:

proposed dredging project

Resource Impacts:

VEGETATION: possible elimination of some tree species

Summary

The Spencer County Drainage Board wishes to dredge Isaac Wright Drain which flows through the national natural landmark. Besides the direct impacts of vegetation elimination to create a ditch, alteration of the water table may affect this lowland forest.

CURRENT SITUATION The National Park Service has assessed the situation and has recommended to the Indiana Department of Natural Resources that the impact could be reduced, or eliminated altogether, by installation of a closed pipeline system and back filling on top of the pipeline in lieu of maintaining an open ditch across Kramer Woods. Such actions may isolate the drainage of water from the ground table, ensuring continuation of natural processes in terms of vegetation composition. The possibility of the county pursuing this recommendation is uncertain at this time.

Kansas

Name: BAKER UNIVERSITY WETLANDS **Location: Douglas County**

Ownership: **Private**

Designation: **July 1969** **Section 8 Listings: 1987-1989, 1992-1996**

SIGNIFICANCE The landmark site contains two tracts that are undisturbed examples of wetland prairie. Such examples are rare today.

DESCRIPTION This 573-acre national natural landmark (NNL) is a breeding ground for many species of amphibians and passerine songbirds. It is also a stopover for migrating waterfowl, shorebirds, and passerines. Eastern gramagrass is dominant in spring and cordgrass in late summer. Scores of other plant and animal species typical of the prairie habitat are found here.

THREAT OR DAMAGE

Source Activities:

construction of highway

Resource Impacts:

WATER RESOURCES: degradation of water quality

WILDLIFE: alteration of population dynamics

VEGETATION: large scale removal

Summary

The city and county are pursuing a four-lane highway construction project. The close proximity of the current routing will eliminate habitat in the NNL. Disturbance will greatly increase due to more traffic along the perimeter of the NNL.

CURRENT SITUATION The site remains threatened by the planned highway construction project. The proposed highway was approved by the voters of Douglas County in 1990. The county has an easement from Haskell Indian Nations University that will allow a routing adjacent to the NNL. They are also considering route options through the wetland. An environmentally preferred routing further away from the NNL would make the project longer and more costly as it would require crossing the Wakarusa River twice. Funding for the entire project has nearly been expended on the western 9 miles alone. The western 9 miles are nearly complete. No funding is currently proposed for the eastern 5 miles. An EIS on the 3 routes through the wetlands is still in progress. The DOI is withholding its position on the eastern part of this project until a Section 4(f) evaluation of cultural resources at Haskell is completed and a final supplemental EIS is prepared and submitted for review and comment.

The Kansas Department of Wildlife and Parks and the U.S. Fish and Wildlife Service are aware of this situation and have been involved in discussions to lessen the impact of the proposed highway construction. The U.S. Army Corps of Engineers has issued a 404 permit to mitigate for the loss of 12 acres of wetlands. The Federal Emergency Management Agency (FEMA) recently stated that much of the 2 alternatives to 31st Street lie within a floodway. A decision as to which of the 3 alternatives to pursue has yet to be made by The Federal Highway Administration or the Kansas Department of Transportation.

Maine

Name: PENNY POND-JOE POND COMPLEX Location: Kennebec County

Ownership: Private

Designation: May 1973 Section 8 Listings: 1989, 1993-1996

SIGNIFICANCE The site is an outstanding, relatively untouched wetland in a glacial outwash plain. It has many vegetation types for such a small area. The three kettle hole bogs are classic examples of northern sphagnum bogs.

DESCRIPTION This 470-acre site contains a complex of kettle hole bogs and ponds in an intertwining network of eskers, which are all part of the Belgrade Esker. Five large ponds, two of which are Penny Pond and Joe Pond, are found in the southern portion of the site. Alder thickets and wooded swamps, predominantly composed of black spruce and red maple, are found along the streams between the ponds. On the eskers, hemlock and spruce are found lower down, but give way to white pine and large stands of American beech higher up.

THREAT OR DAMAGE

Source Activities:
- timbering
- extraction of sand and gravel

Resource Impacts:
- GEOLOGIC RESOURCES: surficial defacing
- VEGETATION: removal

Summary

Eskers on the north, northeastern, and western boundaries have been mined for sand and gravel.

CURRENT SITUATION One owner has a concrete/construction material company on the northern boundary where eskers are being mined. The intertwining eskers along the north, northeastern, and western boundaries of the national natural landmark (NNL) are being damaged by sand and gravel mining. The NNL does not appear to have been ecologically affected by this activity. The owner has not responded to attempts at communication.

One of the owners of the privately-owned land in the NNL has begun a small scale timber harvesting project within 1/4 mile of the ponds. Pines and birch have been proposed to be planted in their place. A dirt road has been excavated for equipment.

Maryland

Name: BELT WOODS Location: Prince Georges County

Ownership: State (Department of Natural Resources)

Designation: December 1974 Section 8 Listings: 1979-1983, 1989, 1992-1996

SIGNIFICANCE The site is one of the few remaining mature upland forests occurring in the Atlantic Coastal Plain physiographic province.

DESCRIPTION This 43-acre undisturbed site is dominated by tulip poplar and white oak. Dominant trees average over 2 feet in diameter at breast height (dbh) and some are as large as 4.5 feet dbh. Of particular interest is the virtual absence of beech on the tract. Understory species include flowering dogwood, spicebush, sweet-haw, and ironwood. There is a unusually high number of bird species here. The site is located within 15 miles of downtown Washington, D.C.

THREAT OR DAMAGE

Source Activities:

adjacent development

Resource Impacts:

ECOSYSTEM: potential visitor impacts, increasing insularization and habitat fragmentation

Summary

The land adjacent to the national natural landmark (NNL) on the north and west belongs to the St. Barnabas Episcopal Church. The church has hired a land use planner and submitted the plans for a subdivision on their property. It is believed that if this subdivision is built, or at least not carefully built, the NNL acreage will be isolated functionally, and directly threatened by incursions from the subdivision. Forest interior-dwelling wildlife currently are present due to the relatively undisturbed acreage and the structural diversity of the vegetation. The Belt Woods Technical Task Force and others are working to try to mitigate impacts from the impending development. Currently, the project is going through the planning process. Central Avenue and Church Avenue, which form boundaries on the south and east of the NNL, are both being widened and improved. Development is occurring across both these two roadways from Belt Woods. Impacts from construction next to the boundary will be minimized, but indirect disturbances from people, pets, and noise may well diminish the values of the landmark.

Probably the most critical impact to this small landmark would be to isolate or cut it off from nearby woodlands, thereby fragmenting the habitat which supports a significant and well-documented population of neotropical migratory birds. Direct impacts could include vegetation removal, runoff problems near the boundary, and changes in wind and temperature regimes as the tract becomes more insular, with subsequent decline of neotropical migrant bird habitat.

CURRENT SITUATION National Park Service (NPS) involvement has been to interact with and provide information to the planning process to assure that the protection of the NNL is considered. The NPS is a member of the Belt Woods Technical Advisory Committee under the leadership of the Maryland Department of Natural Resources, which owns and manages Belt Woods. The NPS also participated in the Planning Board hearings and interacted with the Belt Woods Task Force. As of September 1991, a tentative agreement with the owners of adjacent land would reduce many of the major concerns, and development would proceed in a manner that is compatible with preserving the NNL. The proposal is to leave a companion piece of forest known as North Woods and the central forest intact, along with protection of corridors connecting North Woods to central Belt Woods, as well as buffer zones between the forest and development. These actions would help avoid functional isolation of Belt Woods. On October 29, 1991, the county council approved the zoning including the concept and conditions agreed upon. This prototype settlement is on hold because a developer has not yet been found. On

December 2, 1993, the Comprehensive Design Plan was approved and the next step is the Preliminary Plan of Subdivision. Belt Woods is being listed until it can be further demonstrated that protection of NNL significance will be incorporated into development plans.

Maryland

Name: **LONG GREEN CREEK AND SWEATHOUSE BRANCH** **Location:** Baltimore County

Ownership: State (Department of Natural Resources)

Designation: May 1977 **Section 8 Listings:** 1986-1989, 1992-1996

SIGNIFICANCE The site is an uncommon example of climax mixed mesophytic forest in the Piedmont natural region, and it contains a rich herbaceous flora.

DESCRIPTION This 250-acre site contains a mature beech-tulip poplar-white oak forest with variation from xeric ridges to mesic ravines.

THREAT OR DAMAGE

Source Activities:

invasion of exotic species

Resource Impacts:

VEGETATION: potential alteration of native species composition

Summary

A significant invasion of exotic woody vegetation, primarily multiflora rose (*Rosa multiflora*) and Japanese honeysuckle (*Lonicera japonica*), has occurred throughout approximately 30% percent of the area. This could affect the native herbaceous flora and climax tree reproduction through competition for space, light, and nutrients. This in turn could reduce the abundance of species in the herbaceous layer and interfere with the survival of canopy tree seedings. The exotic Asian grass (*Microstegium vimineum*) is colonizing disturbed areas. Gypsy moth activity has affected about 20% of the canopy.

CURRENT SITUATION No action has been taken to reduce this exotic species invasion.

Massachusetts

Name: GAY HEAD CLIFFS **Location: Dukes County**

Ownership: Tribal (Wampanoag Indian Tribe)

Designation: October 1965 **Section 8 Listings:** 1988-1989, 1992-1996

SIGNIFICANCE The site is distinctive as an exposure of pre-glacial sedimentary formations resting upon the continental shelf and detached from the mainland. It represents an unusual cross section of strata from the Cretaceous through the Pleistocene.

DESCRIPTION Gay Head Cliffs forms the western tip of Martha's Vineyard. The approximately 20-acre site includes approximately 1 mile of the exposed cliff of Gay Head, and is 100-200 yards wide. The cliffs rise vertically for as much as 150 feet above the sea. Their striking colors are white, red, gray, black, and yellow sands, clays, gravels, and lignites of the Raritan and Magothy Formations exposed in Cretaceous sediments. Above these are beds of fossil-bearing green sand of the middle Miocene, overlain by fossil-bearing, iron-impregnated sand of either the Pliocene or the very early Pleistocene.

THREAT OR DAMAGE

- Source Activities:
  - visitation
  - natural coastal erosion
- Resource Impacts:
  - GEOLOGIC RESOURCES: erosion of the cliff face
- Summary
  - The natural erosion of the cliff face is underway by the action of winter storms, precipitation runoff and high tides. However, it is being accelerated by visitors climbing on the cliffs or removing clay from them.

CURRENT SITUATION The town of Gay Head, previous owner of the tract, tried for many years to enforce a town ordinance which prohibits climbing on the cliffs by placing signs at intervals along the base of the cliffs. A lack of funds precluded any active enforcement.

The transfer of the land from the town to the Wampanoag Indian Tribe was completed in August 1987. The Tribe has expressed concern over erosion of the cliffs. They have hired three Conservation Rangers to explain the bylaws and help interpret the area. They are issuing warnings and tickets to those who violate the bylaws. The town of Gay Head voted in 1993 to enforce the bylaws making bathing in and mining of clay illegal. The Wampanoag Tribal Council Inc. (Aquinnah) and the town posted signs highlighting the environmental sensitivity of the cliffs at strategic access points.

The Martha's Vineyard Land Bank Commission has signs posted at the entrance to the beach. The Land Bank Commission hired two beach monitors in 1993 to count beach visitors and explain town ordinances. The Martha's Vineyard Land Bank Commission has purchased land on top of the cliffs.

Massachusetts

Name: LYNNFIELD MARSH **Location: Essex County**

Ownership: Municipal, private

Designation: June 1972 **Section 8 Listings:** 1979-1982, 1988-1989, 1993-1996

SIGNIFICANCE The site is an exceptional freshwater marsh. It preserves habitat for two rare bird species that frequent the area. The marsh preserves the habitat requirements of numerous bird species, including waterfowl.

DESCRIPTION The site is a 540-acre freshwater marsh dominated by cattails, with sedges, grasses, and rushes. Higher ground has cottonwood, red maple, red oak, and alder. The Saugus River flows through the site.

THREAT OR DAMAGE

- Source Activities:
  - urban development
  - dredging
  - contamination
- Resource Impacts:
  - WATER: potential water flow disruption
  - ECOSYSTEM: pollution and sedimentation
  - VEGETATION: invasion of exotic plants
- Summary
  - Much development has occurred on the boundary of the national natural landmark (NNL). Dredging and filling of the wetlands adjacent to the NNL boundary for construction has occurred. There are subsequent increases in anthropogenic inputs into the marsh from development such as toxic run-off from parking lots and golf courses, fecal bacteria, and nutrient inputs. An exotic plant (purple loosestrife) is becoming a problem.

CURRENT SITUATION The site is progressively becoming a habitat island in the midst of surrounding urban development. It is estimated that development surrounds 50% of the perimeter. The marsh is bordered by much large scale development such as an industrial park, hotel, and others. The Lynnfield and Wakefield Conservation Commissions have applied to the State for Area of Critical Environmental Concern status for the marsh. The application is pending.

Dredging of approximately 6x4 feet of the marsh in the vicinity of one of the golf courses has been completed. The project was submitted as Category 2 and rejected by the Army Corps of Engineers in 1995. The area was first proposed for dredging by the Lynnfield Flood Council to alleviate the increased water flow in the area they believe to be part of the Saugus River.

Along Partridge Lane condominiums are completed and have residents. There is a treeline buffering the marsh from the condominiums. The parking garage and business complex at Edgewater Industrial Park borders the NNL. The parking garage is less than 2 feet from the marsh and water runoff may be entering the wetland.

The Lynnfield Conservation Commissioner in conjunction with the Federal Transportation Commission is trying to secure land to protect it from development under the Federal Transportation Enhancement Program. The Boston and Maine Railroad has filed a petition to abandon 7.8 miles of railroad tracks that transect the marsh.

Michigan

Name: HAVEN HILL STATE NATURAL AREA **Location: Oakland County**

Ownership: State (Department of Natural Resources)

Designation: January 1976 **Section 8 Listings: None**

SIGNIFICANCE: The site contains all of southern Michigan's principal forest types in one small tract. It has remained largely undisturbed for the past 75 years.

DESCRIPTION: This 546-acre tract is located in the 5,402 acre Highland State Recreation Area. About 90% of the Natural Area is wooded, 10% is wetland.

THREAT OR DAMAGE:

Source Activities:

New powerline corridor

Resource Impacts:

VEGETATION: tree removal, salt damage

Summary

A new powerline corridor was cut along the natural area's northern boundary along the M-59 road right-of-way.

CURRENT SITUATION: In late winter of 1996, a new powerline corridor was cut along highway M-59, which is the northern boundary for the Haven Hill Natural Area. Over 100 mature white and black oaks were removed, some on Michigan Department of Natural Resources (MDNR) property within the M-59 right-of-way and some on MDNR property outside the M-59 right-of way but inside the dedicated boundaries of the Haven Hill Natural Area. The mature hardwood forest, comprised of 100 to 180 year old trees, extended from the natural area into the right-of-way and to within a few feet of the road shoulder. The Michigan Department of Transportation (MDOT) independently issued a use permit to remove trees within the right-of-way. MDNR, which owns the highway right-of-way property at this site, contends MDOT did not have authority to issue this use permit.

Trespass occurred into the Haven Hill Natural Area as trees were removed in places more than 40 feet outside (south) of the highway right-of-way. Additional trespass occurred at the northwest corner of the natural area, where a "L" shaped corridor was cut into it. At this location the plant community is an old field. Action is pending concerning this trespass and resource damage. A restoration plan is being prepared by the MDNR. The aesthetic character of the Haven Hill Natural Area has diminished as viewed from M-59, and a major powerline now in place within the M-59 right of way, outside but adjacent to the Haven Hill Natural Area, will continue to lessen the visual appeal of the natural area along its northern border.

MDNR plans to restrict horses from the Haven Hill natural Area in 1997. Efforts will begin in 1997 to improve the existing trails through the natural area, including boardwalk installation and removing fill. Runoff of salt continues, which is also transported aerially from M-59 during the winter into the northern white cedar dominated wetland. High concentrations of salt have been measured in its wetland soils. The northern white cedar are being impacted, and non-native weeds are encroaching into the wetland.

Michigan

Name: TOBICO MARSH **Location: Bay County**

Ownership: State (Department of Natural Resources)

Designation: October 1975 **Section 8 Listings:** 1983-1986, 1993-1996

SIGNIFICANCE The qualities of large size, excellent balance between open water and marsh vegetation, good variety of aquatic plant species, lack of disturbance such as man-made intrusions, and high use by large numbers of migrating waterfowl all combine to make this one of the finest freshwater marshes in this part of the country.

DESCRIPTION The 956-acre tract lies immediately west of the barrier sand beach along Lake Huron's Saginaw Bay Shoreline. It is a relatively undisturbed area with three district habitats: a wide expanse of open water, marshland, and a mixed hardwood forest.

THREAT OR DAMAGE

Source Activities:
- contaminants from adjacent landfill
- water level reduction
- exotic species

Resource Impacts:
- ECOSYSTEM: gradual depletion of water table, toxic pollutants
- VEGETATION: competition with exotics

Summary

The site suffers from lowered marsh levels, contamination, and invasion of exotic plants.

CURRENT SITUATION There is limitation on water recharge into the marsh from Lake Huron due to a flood control gate. Water removal from the marsh for irrigation of nearby agricultural land lowers surface and water levels in the fall and spring. The exotic species, purple loosestrife, has invaded the marsh. The possibility of leaking container drums in an adjacent landfill has resurfaced and is being checked. There is no evidence of leaking to date.

Minnesota

Name: ANCIENT RIVER WARREN CHANNEL **Location: Traverse and Big Stone Counties**

Ownership: State, private

Designation: April 1966 **Section 8 Listing:** None

SIGNIFICANCE A channel cut by the Ancient River Warren during the Pleistocene, containing the Hudson Bay-Gulf of Mexico divide, with a lake on each side as evidence of glacial sedimentation.

DESCRIPTION Ancient River Warren cut its huge channel when the river drained Lake Agassiz, presumably the largest temporary lake in North America. This steep-walled river channel is from 1-2 miles wide and 100-130 foot deep in the vicinity of Lake Traverse and Big Stone Lake, and about 50 miles long.

THREAT OR DAMAGE

- Source Activities:
  - mining
  - residential development
- Resource Impacts:
  - GEOLOGY: Destruction of bedrock exposures
  - VEGETATION: Elimination
- Summary
  - Mining of granitic outcrops and expansion of residential development is destroying exposures and will soon eliminate rare plant habitat.

CURRENT SITUATION This is a huge area almost entirely in multiple private ownership (i.e. hundreds of owners). There is no land use plan or coordination. Mining in the valley at Ortonville continues to expand. Most of the natural outcrops below Ortonville have already been impacted. The last big non-impacted site is now being mined. This mining of granitic outcrops for stone also threatens the very restricted habitat for a portion of the State's only population of Ball cactus (*Mammillaria vivipara*) which has "threatened" status in Minnesota. The State is likely to soon loose a unique landform.

The area's bottomlands are destroyed or highly disturbed. The prairies on bluffs are degraded in large part due to overgrazing. Woodland is expanding into the prairie as a result of lack of burning. Residential development continues to expand.

Missouri

Name: BIG OAK TREE **Location: Mississippi County**

Ownership: **State (Department of Natural Resources)**

Designation: **May 1986** **Section 8 Listing: 1993-1996**

SIGNIFICANCE The site is the only sizeable known tract of essentially virgin wet-mesic bottomland hardwood forest remaining in the northern part of the Missouri Alluvial Plain section of the Gulf Coastal Plain natural region.

DESCRIPTION The 80-acre national natural landmark (NNL), part of the larger 1,007-acre Big Oak Tree State Park, contains over 100 trees greater than 4 feet diameter-breast-height (dbh), including bur oak, overcup oak, Shumard's red oak, shell bark hickory, and others. Bottomland hardwood once covered 2-4 million acres in southeastern Missouri in 1780. Now only about 1% remains in remnants of 1,000 acres or smaller, and much of this is intensively managed.

THREAT OR DAMAGE

Source Activities:

progressive drying of the swamp, altered flooding and fire regimes, replacement of bottomland hardwood forests by other plant types because of human activity on adjacent lands, potential levee closure.

Resource Impacts:

VEGETATION: loss of hardwood regeneration, dehydration of the landscape, drainage of wetlands, reduced species number.

Summary

Progressive drying of a deep marsh occurring in the park prior to settlement is causing natural succession of cottonwood and willow. Many virgin oak trees are slowly dying without replacement by seedlings.

CURRENT SITUATION The Department of Natural Resources (DNR) found funds from the State legislature to design water management structures in an effort to replicate natural flooding cycles that are believed to be crucial in maintaining the park's wetland ecosystems. It funded a hydrological study by a private consulting firm in 1995. The results of the completed study provide cost alternatives for the construction of water control structures at different water-holding levels.

The DNR is finalizing the preliminary design drawings for a hydrology restoration project. The General Assembly approved funds for the upcoming fiscal year. The next stage, to eventually place water control structures, is to get necessary local landowner agreements regarding the project need to restore natural flood cycles, and alleviate flooding problems on adjacent private farmlands.

The provisions for funding the New Madrid Floodway Project in the 1996 Water Resources Development Act will close levee gap near New Madrid which will completely isolate the NNL from the Mississippi River. The state park is the focus of attention by the State Parks Threats Action Committee. A Master Thesis project is being developed through Southeast Missouri State University to provide a vegetation monitoring system and some baseline plant community data.

New Mexico

Name: BITTER LAKE GROUP **Location: Chaves County**

Ownership: **Federal (Fish and Wildlife Service)**

Designation: **August 1980** **Section 8 Listings: 1995-1996**

SIGNIFICANCE The site contains sinkhole depressions formed by solution of gypsum-bearing rocks and supports shrub-grassland vegetation representative of the northern Chihuahuan Desert.

DESCRIPTION This 4,080 ha site contains a group of sinkhole lakes formed by solution of gypsum-bearing rocks resulting in caverns and collapsed roofs. Most contain highly saline artesian water. Seepage from these underground springs provide water for Bitter Lake. It is part of Bitter Lake National Wildlife Refuge and includes parts of other wilderness or research natural area designations.

THREAT OR DAMAGE

Source Activities:

Oil and gas exploration activity is occurring within 100 meters of the site boundary.

Resource Impacts:

ECOSYSTEM: Potential impacts to aquifer from drilling, altered landscape just outside the boundary due to road construction.

Summary

Oil and gas exploration directly outside the national natural landmark (NNL) boundary could have impacts on the underground aquifer and result in contamination of water in which several endemic species thrive.

CURRENT SITUATION The Bureau of Land Management (BLM) received an application for a permit to drill on the leased land adjacent to the NNL on July 17, 1995. BLM has 30 days in which to respond. They are currently preparing an Environmental Assessment in compliance with the National Environmental Policy Act. Roads and drill pads are planned to be constructed within the 100 year floodplain. The potential for contamination of biotic communities in the refuge by drill mud, oil and salt water is considerable. There are several federally protected aquatic species within the NNL including several endemics, found only at this location. The Fish and Wildlife Service has met with the BLM several times over the last two years and recommended that a full Environmental Impact Statement needs to be prepared. They maintain the project will impact threatened and endangered species, numerous federal candidate species, proposed critical habitat for the Pecos pupfish, a national wildlife refuge, two research natural areas and a national natural landmark.

New York

Name: PETRIFIED GARDENS **Location: Saratoga County**

Ownership: Private

Designation: April 1967 **Section 8 Listing:** 1993-1996

SIGNIFICANCE The site contains one of the best exposures of fossil calcareous algae, known as cryptozoon.

DESCRIPTION Cryptozoon (calcareous algae) was first discovered and described here. The exposure is impressive, covering about 15,000 square feet. The exposure is essential in understanding the historical geology of the region in the late Cambrian and early Ordovician.

THREAT OR DAMAGE

Source Activity:

potential mining

Resource Impacts:

FOSSIL RESOURCES: potential destruction of fossils

Summary

The fossilized reef extends well off-site. One landowner adjacent to the national natural landmark (NNL) has been granted a rezoning permit to allow mining along NNL boundaries. Impacts to the reef outside the NNL will be severe, due to complete removal. Reef structures within the NNL may be cracked from blasting activities outside the NNL.

CURRENT SITUATION Limestone deposits outside the NNL have been mined by two companies for well over a decade. Approximately five years ago the Volunteers of Petrified Sea Gardens made a handshake agreement with one landowner mining company that the park land including the NNL would not be mined. The Volunteers are trying to increase visitation to the site to try to increase public awareness of this unique geological site.

A mining company is mining directly south of the site. The mining companies are not allowed to mine along Petrified Sea Gardens Road and must leave a burm 200 feet wide and 150 feet high. They have been given a rezoning permit to mine across more land. Noise caused by the two mining companies can be heard on the site. Occasionally fly rock enters the park from nearby blasting.

North Carolina

Name: NAGS HEAD WOODS AND JOCKEY'S RIDGE **Location: Dare County**

Ownership: State (Division of Parks and Recreation), County, Municipal (Towns of Nags Head and Kill Devil Hills), Private

Designated: May 1974 **Section 8 Listings:** 1978-1985, 1987-1989, 1993-1996

SIGNIFICANCE Jockey's Ridge is the largest active sand dune on the Atlantic Coast, and provides an excellent illustration of the entire range of dune development and associated plant succession, from shifting open dunes to forested, stabilized dunes. Many rare plant and animal species also occur within the landmark.

Nags Head Woods is one of the best remaining examples of three very rare maritime forest vegetative communities. These diverse ecological communities are protected from harsh maritime climatic influences by a series of stable and active dune and dune ridges (including Jockey's Ridge). Numerous freshwater ponds are interspersed throughout the woods.

DESCRIPTION A 1,980-acre site, which includes open and forested coastal dunes and freshwater wetlands.

THREAT OR DAMAGE

Source Activities:
 planned installation of wells
 continued residential development

Resource Impacts:
 WATER: potential for excessive pumping
 VEGETATION: large scale removal, or indirect destruction
 GEOLOGIC RESOURCES: extraction or removal of sand, reduction of dunes

Summary

The North Carolina Coastal Management Commission responded to accelerated sand mining operations on the periphery of Jockey's Ridge State Park by designating Jockey's Ridge as a Coastal Area of Environmental Concern (Unique Geologic Formation Category). This designation allows for greater regulation of commercial sand mining operations, which had been permanently removing sand normally available to replenish Jockey's Ridge. Localized vegetation damage is also occurring as private homes are being built in the woods.

CURRENT SITUATION The Nature Conservancy (TNC) compiled research information on which to base opposition when the sand mining company reapplied for a mining permit for the Run Hill dune from the North Carolina Mining Commission in 1989. The mining permit was denied for the north end of Run Hill dune by the North Carolina Division of Land Resources, and an appeal was also denied.

The Dare County Board of Education began a process to obtain permits for construction of a high school on the crest of Run Hill, the active dune at the northern boundary of Nags Head Woods. There is concern that development, and the associated site preparation, could disrupt natural system processes and reduce this dune's shielding influence, thereby enabling increased salt spray transport and wind shear into the forest. The North Carolina Department of Environment completed a study in 1993, recommending that Run Hill be acquired. With help from the Nature Conservancy, Run Hill is now permanently protected.

The towns of Nags Head and Kill Devil Hills, and Dare County, have begun plans to install additional well fields in Nags Head Woods. The wells will supply the reverse-osmosis plant principally from the Yorktown aquifer. Fresh Pond (supplied by the surficial aquifer, as are all the freshwater ponds in Nags Head Woods) will continue to be used as a supplementary supply. A monitoring well will be installed to ensure that the impermeable layer separating these aquifers is not breached, and that this additional pumping does not result in saltwater intrusion into the surficial aquifer. However, adequate management controls must be instituted to reduce the potential of altering the hydrological regime of this ecosystem. A 389-acre tract in the southern portion of the woods was jointly purchased in 1992 by TNC and the Town of Nags Head and added to the Nags Head Woods Preserve.

North Carolina

Name: MOUNT MITCHELL STATE PARK **Location: Yancy County**

Ownership: State (Department of Environment, Health and Natural Resources)

Designation: March 1974 Section 8 Listings: 1978-1979, 1989, 1992-1996

SIGNIFICANCE The site is the highest mountain in the eastern half of the United States. The most extensive stand of Fraser's fir remaining in the country is found here, associated with remnants of a boreal flora and fauna near their southernmost limit.

DESCRIPTION Mount Mitchell, located in the 1,469-acre Mount Mitchell State Park, rises to an elevation of 6,684 feet above sea level. A fine Southern Appalachian boreal forest is represented here. Logging, burning, and livestock grazing did occur from 1900-1920. Canadian zone flora such as red spruce and paper birch are associated with the endemic Fraser's fir. Ravens, which are becoming uncommon in the Southern Appalachians, nest here.

THREAT OR DAMAGE

Source Activities:
- air pollution from fossil fuels is likely one causal factor

Resource Impact:
- VEGETATION: alteration of native species composition

Summary

According to the latest research information, acid precipitation may be contributing to the decline of the Fraser's fir-red spruce forest on Mount Mitchell. The death of mature trees has increased over the last 10 years and the entire ridgetop, where the park is located, has been affected.

CURRENT SITUATION Current evidence indicates acid precipitation is contributing to the decline of montane spruce-fir forest in the Northeast. Drought conditions, ice damage, and the wooly aphid are suggested as other contributing factors. An estimated loss of over 50% of the mature Fraser's fir has occurred. These impacts began to be noticed in the early 1980s. Research into the effect of acid precipitation on the forest is being conducted by North Carolina State University and Virginia Polytechnic Institute. The area is experiencing regeneration of Fraser's fir but will likely suffer damage when the young trees reach maturity.

North Carolina

Name: SMITH ISLAND Location: Brunswick and New Hanover Counties

Ownership: State (Department of Natural Resources), Private

Designation: October 1967 Section 8 Listings: 1989, 1992-1996

SIGNIFICANCE The site's live oak forest is one of the best unaltered examples of sand forest in existence.

DESCRIPTION The 1,200-acre site is one of the wildest and most primitive areas remaining on the Atlantic Coast. The shores of the island provide one of the last safe breeding areas for Atlantic loggerhead turtles in the Southeast. There is a unique system of stable sand dunes that is extremely valuable as an illustration of the stabilization of sand dunes entirely by natural processes. Three islands make up Smith Island-Bald Head Island, Middle Island, and Bluff Island.

THREAT OR DAMAGE

- Source Activities:
  - residential development
  - beach erosion
- Resource Impact:
  - ECOSYSTEM: removal of habitat
- Summary
  - Part of the island is owned by a development corporation and is being developed for second homes. Beach erosion is high on parts of the island.

CURRENT SITUATION Approximately 300 acres of the national natural landmark (NNL) are owned by a development corporation and have been incorporated as a town. Although the landowner wants to maintain the natural integrity of the property as a selling feature, the potential impacts of development could affect the nationally significant features of the NNL. The plan for the development, that is partially complete, calls for one house site per 1.6 acres. The preservation of the maritime forest is jeopardized by home development, treatment plants, wells for water, golf courses, and other associated development. Erosion on the south beach of Smith Island has been high and the major stable sand dune, Bald Head, has been completely eroded. Continued erosion may eliminate the dunes which protect the maritime forest. Federal and State grants plus gifts of land now total approximately 200+ acres owned by the State or The Nature Conservancy. The Bald Head Conservancy owns 22.5 acres of Middle Island. Smith Island is contained within the North Carolina National Estuarine Research Reserve (NERR) System.

North Dakota

Name: RUSH LAKE Location: Cavalier County

Ownership: Private

Designation: May 1975 Section 8 Listings: 1977-1989, 1993-1996

SIGNIFICANCE This site was an excellent, essentially undisturbed example of a large prairie pothole lake and an important breeding and staging area for up to 200,000 waterfowl each year.

DESCRIPTION This 3,696-acre site was a natural seasonal wetland (i.e., it sometimes dried up) during the General Land Office survey made in 1884. Surrounding landowners gained title to Rush Lake, which had become dry, in a 1913 court case. Today, South Rush Lake, or the southern end of Rush Lake, is the deepest portion of Rush Lake and is situated in a glacial depression. Rush Lake receives the majority of runoff in the spring from a drainage basin of almost 180,000 acres. North Rush Lake, or the northern portion of Rush Lake, is outside the national natural landmark (NNL) boundary, but is continuous with South Rush Lake. A multi-dike system constructed in the 1950s and approved by the court in the 1960s divides North and South Rush Lakes. Extensive channel work has been created by landowners both upstream and downstream of South Rush Lake in an attempt to control the lake's water level and drain floodwaters. North Rush Lake has been dry or nearly dry since the late 1960s. Adjacent lands are farmed, primarily for wheat, barley, oats, flax, and sunflowers.

THREAT OR DAMAGE

Source Activities:

ditching/diking

Resource Impacts:

WATER: lowering of water table

VEGETATION: destruction of wetlands ecosystem

WILDLIFE: a disruption of breeding and migratory patterns due to loss of habitat

Summary

South Rush Lake continues to be maintained at an artificially reduced level of 1551.4 feet above mean sea level, and North Rush Lake continues to be farmed. It has been negatively affected by sedimentation carrying pesticides and nutrients from cropland run-off and by artificially manipulated water levels. Substantial loss of waterfowl habitat has occurred. However, some claim South Rush Lake could still be restored to a viable wetland.

CURRENT SITUATION From 1985 to 1992, various attempts were made by the State and county to restore Rush Lake. These initiatives were not implemented because they were not supported by local landowners. The Cavalier County Water Board is currently working with other agencies on a South Rush Lake Restoration and Flood Control Project. This project would require a fee title purchase of 4,500 acres of South Rush Lake. The level of South Rush Lake would be set at 1552.5 feet msl elevation. Existing waterways would be cleaned and restored. This would provide a mix of agricultural and environmental interests. However, affected landowners in the Rush Lake watershed have to be willing to provide a water management plan that addresses the issues necessary to complete a restoration. The 1987 Section 8 Report indicated a formal reevaluation of the natural integrity of the site was needed and that de-listing of the site as a NNL was an option. De-listing has not yet been sought as the State and County along with others have been working to see if a restoration plan could be implemented. The North Dakota Wetlands Trust has initiated the most recent attempt to acquire land and restore Rush Lake. The site has been retained on Section 8 since 1987, until it can be determined whether restoration can be implemented.

The Board of Directors for the North Dakota Wetlands Trust has changed since the project was first considered in 1991-1992. The new Board of Directors has voted against the project. The current status of the project has come to a standstill, therefore if a plan is to be implemented, the North Dakota State Water Commission would be the lead agency according to representatives of the North Dakota Wetlands Trust. The Rush Lake Restoration and Flood Control Project would be the avenue and perfect opportunity to restore a valuable wildlife area and also provide flood control measures to protect the surrounding landowners agricultural interests and livelihoods. The Cavalier County Water Board may pursue both flood control and restoration, whereas the North Dakota Wetlands Trust may pursue the flood control portion of the project. Last year, hundreds of thousands of ducks migrated through the area of Rush Lake and benefited from this wetland habitat.

Ohio

Name: DYSART WOODS Location: Belmont County

Ownership: Private

Designation: April 1967 Section 8 Listings: 1988-1989, 1992-1996

SIGNIFICANCE The site contains one of the best remaining examples of white oak forest in eastern Ohio.

DESCRIPTION This 456-acre tract contains about 40 acres of virgin white oak forest and another 30 acres of near-virgin mixed mesophytic hardwoods. It contains trees as much as 400 years old.

THREAT OR DAMAGE
Source Activities:
proposed coal mining
Resource Impacts:
WATER: potential lowering of the water table and decrease in soil moisture
VEGETATION: potential ground subsidence causing root damage.
Summary
A coal company has proposed that an area adjacent to the landmark be used for mining coal. If this occurs, depletion of the water table and subsidence could result.

CURRENT SITUATION A permit application to do longwall coal mining next to the site has been approved by the Ohio Department of Natural Resources (DNR). The coal company owns mineral rights next to the forest but not under it. In longwall coal mining, a machine eats out the underground coal seam and no supports are erected to prevent cave-ins.

The Ohio DNR's Division of Reclamation reviewed the application, taking into account concerns raised at an informal conference held in 1990, including the National Park Service's written comments. The Ohio DNR found that the revised application meets all requirements of Chapter 1513 of the Ohio Revised Code and that, since the proposed mining is 0.43 miles southeast of the national natural landmark, it is not a primary concern. The State is planning to continue to pursue funding to do a study of the ecological and hydrological effects of underground mining.

Ohio

Name: MENTOR MARSH Location: Lake County

Ownership: State (Department of Natural Resources), Private

Designation: October 1964 Section 8 Listings: 1978, 1981, 1988-1989, 1992-1996

SIGNIFICANCE This site is one of the best examples of marsh habitat in northern Ohio.

DESCRIPTION The 700-acre site contains marsh vegetation, swamp and bottomland forest, and upland forest. It is an important stopover for migrating waterfowl.

THREAT OR DAMAGE

Source Activities:

saltwater intrusion

Resource Impacts:

VEGETATION: alteration of native species composition

Summary

There were high salt concentrations in the marsh as a result of seepage from a salt "landfill" on adjacent property and from brine spilled into adjacent marsh and tributaries in the 1960s and 1970s. *Phragmites sp.* now covers 80% of the marsh, a change in the previous vegetative composition.

CURRENT SITUATION Floral and faunal changes have occurred. High salt content, high levels of Lake Erie, increased flow of Marsh Creek and Black Brook, and beavers may all have contributed to swamp forest die-back. Outside the boundary, an owner has constructed a diversion ditch which will allow Black Brook to bypass the salt-fill area, as advised by the Ohio Environmental Protection Agency. This diversion may resolve the salt problem.

The City of Mentor has just gained voter support in a local referendum to purchase Mentor Lagoons and will pursue preservation of this property. The ODNR, Division of Natural Areas and Preserves has recently acquired a conservation easement from Mentor Lagoons on 79 acres of wetlands adjacent to Mentor Marsh Nature Preserve. ODNR continues to pursue acquisition of in holdings within Mentor Marsh through its coastal wetlands grant from the U.S. Fish and Wildlife Service.

Development pressures around the marsh continue. A local developer has recently proposed a subdivision at the east end of the nature preserve on the old salt fill area. Fire frequency and intensity have increased over the past few years. The ODNR, Division of Natural Areas and Preserves has initiated formal agreements between the agency and local fire departments to facilitate control and management of marsh fires.

Ohio

Name: SERPENT MOUND CRYPTOEXPLOSIVE STRUCTURE

Location: Adams, Highland, and Pike Counties

Ownership: Private

Designation: February 1980 Section 8 Listing: 1994-1996

SIGNIFICANCE The site is a structure of unknown origin exposed here by differential erosion. It is the smaller of two such outstanding features in the Interior Low Plateaus. This site is the classic American example of this feature.

DESCRIPTION The 9,500 acre site contains the 3 mile-diameter structure. The central area has been uplifted about 950 feet and shatter-cone features exist, produced by shock. The oldest rocks are Middle Ordovician to Mississippian. Deposits of glacial till of Pleistocene age overlie the northwestern part of the structure. The strata within the central area have been folded into seven radiating anticlines separated by high angle faults and grabens. Faults are predominant on the north and west and six grabens are present to the south and east. Numerous faults are evident. Some believe the structure was formed by gas explosion and others think meteor impact was responsible.

THREAT OR DAMAGE

Source Activities:

Recreational development

Resource Impacts:

GEOLOGY: the interpretive value of the sites would be decreased

Summary

A proposed artificial lake would inundate much of the NNL and additional development would decrease the site aesthetics and interpretive value.

CURRENT SITUATION There are plans to develop a lake and resort community in the western portion of the structure. The proposed 1,000 acre lake would be created by damming Brush Creek.

The ODNR, Division of Natural Areas and Preserves recently designated an 80 acre privately owned parcel known as Bluejay Barrens as a state natural landmark. In addition, the Ohio Chapter of the Nature Conservancy has acquired a 125 acre tract adjacent to Bluejay Barrens and is actively pursuing management of this property. No formal announcements have been made regarding the status of the proposed lake on Brush Creek.

Oregon

Name: NEWBERRY CRATER **Location: Deschutes County**

Ownership: **Federal (U.S. Forest Service)**

Designation: **January 1976** **Section 8 Listing: 1994-1996**

SIGNIFICANCE The crater is a basin at the top of a dormant, though young, volcano. It is the largest Pleistocene volcano east of the Cascade Range.

DESCRIPTION Newberry Crater is a shield volcano 64 km long and 40 km wide which stands isolated and conspicuous approximately 56-64 km east of the Cascades on a broad plateau of lava. The basin, technically a caldera not a crater, is 8 km long and 6.4 km wide. The caldera was formed when the mountain collapsed about 10,000 years ago. The caldera is forested with ponderosa and lodgepole pine. The national natural landmark (NNL) is 7,042 ha.

THREAT OR DAMAGE

Source Activities:

potential geothermal powerplant construction

Resource Impacts:

GEOLOGY-potential alteration of geothermal resources

Summary

A proposal has been submitted to build and operate a 30-megawatt geothermal power plant on leased lands in a national forest.

CURRENT SITUATION The Bonneville Power Administration, in its search for alternative energy sources, has initiated a program to develop partnerships between utilities and private developers for the purpose of geothermal exploration and development. As a result of this Bonneville Power initiative (i.e., Newberry Geothermal Pilot Project), the CE Exploration Company of Portland, Oregon, in cooperation with the Eugene Water and Electric Board, has submitted a proposal to build and operate a 30-megawatt geothermal power plant on leased lands within the Deschutes National Forest. It is conceivable that the project could be expanded to a capacity of 100-megawatts contingent upon further environmental assessments. In the summer of 1994, two Environmental Impact Statements (EISs) were completed for the Newberry Area. The first one, completed in June, was a multi-agency EIS written specifically for the proposed 30-megawatt geothermal powerplant. The United States Forest Service (USFS), Bureau of Land Management, and Bonneville Power Administration cooperatively wrote the EIS, and each agency wrote its own record of decision. The NNL lies outside the geothermal development area. The second EIS was written solely by the USFS, and established the Comprehensive Management Plan for the Newberry National Volcanic Monument. The NNL is located within the boundary of the USFS National Volcanic Monument. Neither EIS identified any impacts to the NNL.

Based on information analyzed and disclosed in the final EIS, public comments, the Deschutes National Forest Plan, the Newberry National Volcanic Monument legislation, and associated documents that the final EIS is tied to or incorporates, the Forest Service approved the geothermal activity proposed in Alternative B, with specific prescribed mitigation and monitoring elements including the following modification: plant site 3 is not to be developed as the power plant location. Only plant sites 1 and 2 are to be considered for final plant siting of this facility. In short, Alternative B provides flexibility for the agencies as well as the operator for on-the-ground siting of well pads, power plant, pipelines, and access roads. Alternative B is described in detail in the final EIS, and highlights include: development of exploration/production well pads at 14 out of 20 possible locations; siting the individual well pads within a 40-acre or less siting area; construction and operation of one 33-MW power plant at one of three possible locations; construction of associated pipelines and access roads; construction and utilization of a single pole design 115-kv transmission line to the south of Forest Road 9735; and additional mitigation and monitoring measures. Facilities in Alternative B would be permanent, with a contract life of at least fifty years.

The project has been approved by the responsible agencies and has been issued a Site Certificate by the State of Oregon. The Deschutes National Forest and the Bureau of Land Management issued Records of Decision approving the project on June 30, 1994. The Bonneville Power Administration issued a Record of Decision to execute the power purchase Agreement on September 16, 1994. The Site Certificate was issued on March 11, 1996

Exploratory well drilling and testing was conducted by the CE Exploration Company during 1995 and 1996. Geothermal power production will not be available November 1997 as previously scheduled. Geothermal resource development by the CE Exploration Company of Portland, Oregon has been deferred at this time. The Northwest Power Planning Council has requested further study of the economic feasibility of geothermal resource development at this site. On July 1996, CalEnergy (CE Exploration's parent company) notified the Bonneville Power Administration that it had determined that the geothermal resource within the project area was insufficient to meet CalEnergy's obligations under the Power Purchase Agreement on a cost effective basis and that it was proposing to relocate the project site in California. The Northwest Power Planning Council has requested independent review of CalEnergy's determination.

Pennsylvania

Name: PRESQUE ISLE Location: Erie County

Ownership: State (Department of Environmental Resources)

Designation: November 1967 Section 8 Listings: 1992-1996

SIGNIFICANCE: The isle is actually a peninsula or "flying spit" formed by sand carried by the currents of Lake Erie. It is an impressive illustration of this type of formation and the largest in the Great Lakes region. The site is also unusual in that plant succession from shoreline to forest can be seen in less than 1 mile.

DESCRIPTION This 3,200-acre site is actually a peninsula jutting out into Lake Erie. The spit may have formed when Lake Erie was born, some 11,000 years ago. The spit has been moving easterly since its creation. An ecological reserve was created encompassing beach area to climax forest. One of the main north-south migration routes for land and shore birds passes directly over the peninsula. As many as 200 species of birds have been identified here.

THREAT OR DAMAGE

Source Activities:

- breakwalls (breakwaters)
- sand placement

Resource Impacts:

- GEOLOGIC RESOURCES: potential beach erosion
- VEGETATION: possible impacts from sand placement on beach derived from offshore

Summary

Beginning in 1989, 55 segmented offshore breakwalls, which are 150 feet long and separated by gaps of 350 feet, were constructed along the lake side of Presque Isle, based on Army Corps of Engineers (Corps) recommendations. They were completed and dedicated on June 7, 1993. This $27.5 million project is an attempt to prevent accelerated erosion of the peninsula and maintain littoral movement of sand at rates that would normally occur without any sand replenishment of the beaches by human intervention. It is not known to what extent, if any, breakwater construction will affect erosion/accretion rate at Gull Point. Gull Point is the location of 45 of the 63 rare and endangered plants at Presque Isle. Prior to the spring of 1991, beach replenishment was conducted with upland sand. No upland sand has been used since then. Scheduled annual beach nourishment is being done as originally planned. However, the Corps indicates that between 1991 and 1995, Gull Point has maintained a net average growth rate of 1.86 acres per year; this is in excess of 0.4 acres annual average growth rate before beach nourishment activities began in the 1960s.

CURRENT SITUATION The State believes the breakwalls project will provide a solution to the ongoing erosion along the peninsula beachfront. They have contributed 50% of the total cost of $27.5 million for the entire project. The state park superintendent believes Gull Point, that point on the peninsula where the accretion of sand still occurs, has not been negatively affected and that the breakwalls are working just as expected. Army Corps of Engineers (Corps) and Fish and Wildlife Service (FWS) studies up to 1991 report no evidence of significant change to the area. It still is not certain whether the breakwalls management strategy will stabilize the beach area at Presque Isle and enhance and protect the unique peninsula, or whether it will ultimately degrade the spit and thus diminish the values being recognized as nationally significant. In 1989, some local groups wanted a moratorium on breakwall construction until it could be determined if the breakwalls preserve or degrade the peninsula. A Congressional field hearing on this issue was held June 22, 1990. Corps' data (see summary) indicate growth rather than depletion is occurring.

The beach replenishment program is supervised by the Corps. From 1976 through 1990, the Corps used primarily upland sand that has formed pebble beaches or pavement-like substrates. There was a small replenishment in the Beach #8 and Lighthouse Beach areas in 1991 using upland sand. Upland sand is foreign habitat for the common tern and the piping plover, and might also influence some of the 63 rare plants of Presque Isle. No upland sand has been used for replenishment since the spring of 1991 and none will be used for future replenishment. Sand pumping is currently being used for the beach replenishment program. This type of replenishment involves lake-dredged sand, and has been used for over 20 years. A floral study was completed in 1992 by the Cleveland Museum of Natural History and a faunal study was completed in 1991 by the FWS at the request of the Corps. These studies can help establish an inventory baseline for future monitoring. A piping plover was spotted at the eastern end of Gull Point in mid-May 1992. There has been no use of upland gravel at Gull Point, the nesting site of these species. The Corps is conducting a biological survey at Gull Point which will attempt to document any induced changes 5 years after project completion (1998). At this point, no firm conclusion can be drawn as to the affects of breakwall construction on the national natural landmark. The site is being listed until more is known on the longer-term effects of breakwall construction on the nationally significant features.

Pennsylvania

Name: WISSAHICKON VALLEY Location: Philadelphia County

Ownership: Municipal

Designation: March 1964 Section 8 Listing: None

SIGNIFICANCE A relatively undisturbed, ecologically diverse valley within the city limits of one of the country's large metropolitan areas.

DESCRIPTION This 1,250 acre tract is 6 1/2 miles long, consisting of 1/3 of Philadelphia's famed Fairmont Park, protected since 1868. The steep-sided valley is wooded with large hemlocks along Wissahickon stream, projecting an uncommon primeval beauty. It is the type locality for Wissahickon Gneiss.

THREAT OR DAMAGE

- Source Activities
  - pollution
  - trampling
  - exotic species
- Resource Impacts
  - WATER: siltation
  - GEOLOGY: soil erosion
  - VEGETATION: understory reduction, exotic species invasion
- Summary
  - Heavy visitor use is impacting the understory vegetation (exacerbated by deer and exotic plants) and stormwater runoff is polluting the Valley's stream.

CURRENT SITUATION Hikers, bikers, horseback riders, fishermen and others are causing soil erosion, aggravated by an abundant deer population that is reducing vegetative cover. Sediment is dumped into the Valley stream because of poorly controlled municipal stormwater runoff.

Steps to improve the condition of the Valley are underway via the Fairmont Park Commission and Friends of Wissahickon, such as revegetation, drainage repair, and removal of exotic plants. A deer population study and a trails master plan study are underway. The Park Commission recently produced new user regulations to limit visitor use. Funding influences the extent of actions presently taken. The site is being listed until the effects of these positive ongoing conservation efforts is better known.

Puerto Rico

Name: RIO ABAJO Location: 9 miles south of Arecibo

Ownership: Puerto Rico (Department of Natural and Environmental Resources)

Designation: February 1980 Section 8 Listings: 1992-1996

SIGNIFICANCE The site is an excellent example of karst topography, with numerous sinkholes and well-developed tower karst. It is the only place in Puerto Rico where the Eocene-Oligocene unconformity can be seen. It is one of the best semi-deciduous forest areas in Puerto Rico, in terms of the number of species and size of the trees.

DESCRIPTION This 5,612-acre site is situated on the top surface of mid-Tertiary limestones, lying unconformably on Eocene formations. Karstic forms are strongly developed in the limestone with large sinkholes, roughly 100 feet or more deep. The vegetation is of four different types: deciduous, semi-deciduous, evergreen, and thorn scrub. Over 500 plant species are found here, thirty of which are rare in Puerto Rico. The site is a Commonwealth Forest, managed primarily for watershed values, plantation establishment, and low intensity recreation.

THREAT OR DAMAGE

- Source Activities:
  - highway construction
- Resource Impacts:
  - ECOSYSTEM: removal by highway construction
- Summary
  - About 200 acres of the national natural landmark (NNL) will be destroyed by the time highway construction is completed, and much more will be lost if the alignment is not confined to the edge of the NNL but moved into the forest.

CURRENT SITUATION When construction of Highway 10 was approved in the early 1980s, an agreement was made to compensate the Puerto Rican Department of Natural Resources (PRDNR) by purchasing marsh lands of equal value. Lands adjacent to Rio Abajo forest were to be purchased and added to the forest. Because forest lands east of the new road would be separated from the rest of the forest, and because these were the lands most likely to be used by squatters, it was decided that the highway would become the new eastern boundary of the forest. Highway construction is in progress and will ultimately eliminate vegetation along a distance of 5-6 km. Sinkholes have been affected.

South Dakota

Name: BUFFALO SLOUGH Location: Lake County

Ownership: State (Department of Game, Fish and Parks)

Designation: July 1980 Section 8 Listings: 1992-1996

SIGNIFICANCE The site provides an excellent example of native bluestem prairie that blends into the typical native emergent vegetation of the prairie pothole.

DESCRIPTION This 600-acre site is located about 20 miles north of Sioux Falls. Buffalo Slough is a large natural pothole-type wetland that receives high use by many forms of wildlife. Open water normally covers about 35% of the wetland and lush emergent vegetation covers about 65% of the marsh. Normal water depth ranges from 1/2-5 feet. Three-square bulrush is abundant. *Phragmites sp.*, round-stem bulrush, and cattail give way to open water and prevalent submergent vegetative species. The site receives high concentrations of waterfowl during annual migration. Significant numbers of small mammals also utilize the site.

THREAT OR DAMAGE

Source Activities:

tree cutting

Resource Impacts:

VEGETATION: eventual loss of trees

Summary

The owner of the land adjacent to the national natural landmark (NNL) has topped approximately 80 eastern red cedar trees in the center of a 30-year-old shelterbed within the NNL. The trees will eventually die, leaving a gap in the shelterbed.

CURRENT SITUATION A center pivot irrigation system that was too long for the surrounding area was installed outside the NNL. To allow a full circle pivot of the system, trees were cut inside the NNL. A civil suit may be filed against the owner. A South Dakota state forester is reassessing the damage to the trees to determine through various formulas the monetary value of the damaged trees. The restoration to the trees that were damaged will not take place until the situation has been solved and the State has received restitution.

South Dakota

Name: LAKE THOMPSON **Location: Kingsbury County**

Ownership: State (Department of Game, Fish and Parks)

Designation: May 1975 **Section 8 Listings:** 1992-1996

SIGNIFICANCE The site is the largest natural lake bed in South Dakota and contains one of the largest undisturbed and unmanipulated marshes in the State and in the Midwest. It serves as a major waterfowl resting area in the Central Flyway.

DESCRIPTION The marsh contained in the 8,872-acre national natural landmark is in the later stages of natural succession, with the open water area reduced to about 1,000 acres at a maximum depth of 3.5 feet. Emergent vegetation consists of three-square bulrush and common reed in the shallower water and various grasses around the edges. Snow geese, Canada geese, and white-fronted geese use the site. Mallard, pintail, redhead, canvasback, and wood ducks nest here. Other notable birds include avocets, plovers, godwits, yellowlegs, sandpipers, double-crested cormorants, great blue herons, and egrets (great, cattle, and snowy).

THREAT OR DAMAGE
Source Activity:
flooding
Resource Impacts:
WILDLIFE: displacement and loss of habitat
Summary
Flooding of the basin, and the resulting loss of habitat, has forced resident wildlife species to surrounding areas.

CURRENT SITUATION A dramatic loss of waterfowl habitat resulted from Lake Thompson's 1987 inundation. Since 1987, years of 50% above-average precipitation, combined with the draining of approximately 300,000 acres of wetlands in the watershed, led to continued inundation of the basin. The lake surface is nearly three times the size it was when originally designated. Planned restoration work in the watershed may possibly replace the wetland losses. Presently the lake is being managed as a fishery with populations of walleye pike, northern pike, black crappie, yellow perch, largemouth bass, and bluegills.

In 1987, the South Dakota Wetlands Preservation and Restoration Committee was established to provide technical expertise and identify sources of funding for wetland restoration. The objectives of the Lake Thompson Watershed Plan are: 1) restoration and protection of wetlands on private lands 2) acquisition of flooded private lands in the basin from willing sellers and 3) management of all small wetland units within the watershed. To date, approximately 4,000 acres have been acquired from willing sellers in and adjacent to the Lake Thompson basin. Funding for land acquisition and habitat development has come from the North American Wetlands Conservation Act, National Wildlife Federation Corporate Conservation Council, Ducks Unlimited, Inc., and the State of South Dakota with matching Fish and Wildlife Service administered Pittman-Robertson Federal funds. In addition, Ducks Unlimited and the National Wildlife Federation have assisted the State in acquiring about 2,500 acres at Whitewood Slough, which is a few miles away. Waterfowl management practices are underway on the acquired lands. The communities of Arlington, Lake Preston, and DeSmet sponsored the first annual Lake Thompson Waterfowl Festival in April 1992 to showcase the wetlands and waterfowl resources of the area. The Waterfowl Festival is a waterfowl habitat cooperating partner. The Lake Thompson Project Coordinator for the Department of Game, Fish and Parks Department is working on projects to assist with the restoration of the wetland area. The area has experienced even more high water due to increased precipitation and flooding during the spring and summer of 1993. Lake Thompson cooperators also include the Natural Resources Conservation Service, Agricultural Stabilization and Conservation Service, and private landowners.

The draft Multi-Objective Hazard Mitigation Plan for the Vermillion River Basin (which includes Kingsbury County and Lake Thompson). It addresses the issues of flood loss reduction, channel alignment, fluvial geomorphology, transportation systems, and drainage. The State is in the process of reevaluating the focus of the Lake Thompson project. They will continue to operate there regular habitat programs, however they will evaluate the cost effectiveness of some of their wetlands programs in the same area. There is an organized effort by the Kingsbury, Lake and Miner county commissions to form a water management district, with the sole purpose of draining Lake Thompson down to its original 8,800 acre size.

Tennessee

Name: REELFOOT LAKE Location: Lake and Obion Counties

Ownership: Federal (Fish and Wildlife Service), State (Wildlife Resources Agency and Department of Conservation)

Designation: May 1966 Section 8 Listings: 1988-1989, 1992-1996

SIGNIFICANCE The site is the largest natural lake in Tennessee, with a wide array of biotic communities. It presents outstanding research and teaching opportunities in geology and ecology.

DESCRIPTION The national natural landmark (NNL) is a 23,000-acre area of cypress swamps, sawgrass jungle, water lily glades, and scattered bodies of open water. The NNL represents a landscape that was formed in the winter of 1811-12 as a result of a succession of shocks designated collectively as the New Madrid earthquake, the most severe recorded in the United States. Over an area of some 30,000-50,000 square miles, there occurred phenomena characteristic of intensive shocks, such as domes and sunken lands, fissures, sinks, sand blow-outs, and large landslides. The sinking of a large area and temporary damming of the Mississippi River tributaries formed the lake.

THREAT OR DAMAGE

Source Activities:

agricultural use

Resource Impacts:

ECOSYSTEM: loss of recreational waters to sedimentation

VEGETATION: potential species change and vegetation loss due to siltation; encroachment of aquatic vegetation into open water areas

Summary

Reelfoot Lake canals are gradually being filled from silt brought by streams that flow into the lake. Rapid siltation results from agricultural practices on private lands on the lake's watershed outside the NNL. Non-point sources of agricultural run-off containing phosphates and nitrates increase aquatic plant growth. The annual accumulation of dead plant matter adds to the lake-filling problem, creating a mucky bottom. The biota in the lake will change as a result of siltation and fertilization.

CURRENT SITUATION Within the NNL, an area of more than 9,000 acres in the north section of the lake is leased to the Fish and Wildlife Service (FWS) as the Reelfoot National Wildlife Refuge. An environmental impact statement (EIS) on the proposed lake drawdown has been finalized by the FWS in 1988. The EIS was the result of litigation associated with attempts by Tennessee Wildlife and Resources Agency (TWRA) to lower the lake level 8 feet on a temporary basis in hopes of consolidating the silt and accumulated organic material within the lake.

The preferred alternative included two of the proposed EIS alternatives: a dynamic water level fluctuation combined with a major drawdown for addressing the siltation and vegetation problems within the lake. Also proposed within the EIS is the construction of a sediment basin at the mouth of Reelfoot Creek, which is the source of 50% of the silt. This sediment basin is expected to retain about 70% of the silt brought in by that stream. Other sediment basins have been constructed, and others proposed within the Reelfoot Creek watershed.

Associated with the TWRA's 50 Year Management Plan for Reelfoot Lake, the Corps of Engineers (Corps), with input from the FWS, completed a reconnaissance study to determine the appropriate Federal role in addressing some of the issues identified in the management plan. Issues identified for further study include the sediment basin at the mouth of Reelfoot Creek, dredging of water circulation/channels, a new spillway structure, and restoration of waterfowl management areas south of Reelfoot Lake adjacent to and including Lake Isom National Wildlife Refuge. A $3 million feasibility study by the Corps, with the State paying half of the cost, is currently underway. Completion date for the three year study is January 1999.

Improved management practices by private landowners on several thousand acres in the watershed have helped reduce the erosion problem somewhat. The State of Tennessee and the FWS have acquired property around Reelfoot Lake up to the 285 feet msl elevation to allow water level management without impact on adjacent lands. A total of 5,372 acres has been purchased by the State around the lake, with an additional 3,500 acres identified as needed by the FWS if the preferred alternative of higher fluctuating water level is to be implemented.

Texas

Name: NATURAL BRIDGE CAVERNS **Location:** Comal County

Ownership: Private

Designation: October 1971 **Section 8 Listings:** 1995-1996

SIGNIFICANCE A multilevel cavern system replete with beautiful and unusual "fried egg" speleothems and intricate helictites and soda straws.

DESCRIPTION This 300-acre site contains a 60-foot natural bridge spanning the sinkhole entrance. Below is a multilevel cavern system replete with beautiful speleothems. Trails, lights and other developments allow visitation by the public.

THREAT OR DAMAGE
- Source Activities
  - proposed water storage reservoir
- Resource Impacts
  - Ecosystem: potential alteration of natural processes that formed the caverns.
- Summary
  - A proposed water storage reservoir about one mile from the cave will flood it.

CURRENT SITUATION There is a proposed dam project on upper Cibolo Creek which could potentially fill the downstream cave with water beyond that which occasionally occurs by natural flooding. There is also local concern that the dam project will impact another cave - Bracken Bat Cave - only about 1/2 mile from Natural Bridge Caverns.

The San Antonio River Authority approved funding for studies of two potential water storage reservoirs. The studies are a precursor to deciding where to place pipelines and reservoirs. The National Park Service has submitted it's concerns and is ready to review any environmental documents prepared.

Texas

Name: SANTA ANA NATIONAL WILDLIFE REFUGE **Location: Hildalgo County**

Ownership: Federal (Fish and Wildlife Service)

Designation: October 1966 **Section 8 Listings:** 1977, 1992-1996

SIGNIFICANCE The site is an excellent example of mid-valley riparian forest that has largely disappeared from the lower Rio Grande Valley.

DESCRIPTION The 2,086-acre site is located on the United States-Mexico border in a bend of the Rio Grande River. Vegetation is chiefly a lowland-mesquite forest of native trees, interspersed with areas of mesquite-cactus association. Twelve different vegetation types have been described here. With about 20 inches of annual rainfall, the area could be described overall as dry sub-tropical. Woodland, brushy areas, lakes, and ponds provide habitat for a number of Mexican bird species, whose extreme northern limit of distribution is the lower Rio Grande Valley. Over 390 species of birds are listed for the refuge. The mammal population includes ocelot and jaguarundi, which are Federally listed endangered species. Over 450 species of plants grow on the refuge, two of which occur nowhere else in Texas.

THREAT OR DAMAGE

Source Activities:

damming of river inflow

Resource Impacts:

VEGETATION: nutrient and water depletion due to lack of groundwater recharge and reduction in flood frequencies

Summary

Falcon Dam, constructed upstream from Santa Ana National Wildlife Refuge in 1953, has effectively stopped the natural flooding regime. Due to dam construction, siltation no longer replenishes nutrients in the soil. Water is no longer available to recharge wetlands, forests, and groundwater, and the water table is dropping. The dam has stopped the semi-annual floods required by those plants adapted to such a flooding regime. Plants, especially large trees, are dying and slowly being replaced by different species which are more xeric (i.e., preferring dry locations) in nature. The refuge contains rare species which could potentially be lost.

CURRENT SITUATION Plant and animal communities are changing from flood forest to thorn scrub. There have been no scientific studies yet to quantify species loss. These changes are subtle and difficult to document without long-term monitoring. A long-term resaca flood forest vegetation monitoring project was initiated in 1995 to compare vegetation structure or diversity in flooded versus unflooded areas on the refuge. Irrigation water is applied to forest and ponds. This water lacks silt (nutrients) and is expensive, thus cannot be applied in adequate volume to substitute for natural flooding. This helps slow the vegetation conversion but cannot substitute for actual flooding. The Fish and Wildlife Service has completed a water resources management plan for the refuge. It calls for additional flooding capabilities. One project is near completion. It will allow flooding of more remote resaca and flood forest areas on the refuge by pumping water directly from the river through a 15 inch pipeline. Pumping schedules are planned to emulate the historical spring flooding period (April-June).

U.S. Virgin Islands

Name: SALT RIVER AND SUGAR BAY **Location: St. Croix**

Ownership: Government of the Virgin Islands, Federal (National Park Service), Private

Designation: February 1980 **Section 8 Listings:** 1986-1989, 1993-1996

SIGNIFICANCE The inner shoreline of Salt River Bay, including both Sugar and Triton Bay tributaries, contains the best remaining stands of mangrove vegetation in the Virgin Islands and the largest stand of mature mangroves on St. Croix. These relatively undisturbed stands illustrate a zonation of mangrove species and other interrelated flora. This habitat also supports a multitude of bird species, including a significant wintering population of North American warblers and a mixed wading bird rookery. The submarine canyon at the mouth of Salt River Bay provides habitat for deep water corals, sponges, and fishes. The bay is geologically significant as an illustration of mixed carbonate and clastic sedimentation processes.

DESCRIPTION This 690-acre site contains Salt River Bay, including Sugar Bay and Triton Bay tributaries. Together the bays encompass a variety of tropical marine and terrestrial ecosystems. It includes mature mangrove forests and one of the last remaining stands of the large swamp fern. The area contains a most significant, high energy tropical reef system.

THREAT OR DAMAGE

Source Activities:

proposed commercial development
proposed dredging and channelization
increased and unrestricted recreational use
exotic species invasion

Resource Impacts:

ECOSYSTEM: destruction of mangrove ecosystem by human activity
WATER: alteration of coastal processes, degradation of water quality
VEGETATION: removal and alteration of native species composition, competition with exotics
WILDLIFE: loss of habitat, competition with exotics

Summary

The landmark is a very attractive site for recreation and resort development. At present, the areas are vulnerable to development by the private sector since there have been insufficient funds allocated for the National Park Service or any other public body to purchase and protect the area.

CURRENT SITUATION After eight years of litigation, the U.S. District Court of the Virgin Islands rendered a decision on June 1994 invalidating a coastal zone management permit obtained by Sugar Bay Land Development Ltd. The company sought the permit to develop a 588 unit condominium, hotel, and marina complex within the landmark boundary. Resort development in the area has been opposed by the Virgin Islands Conservation Society. However, the invalidation of this permit does not preclude Sugar Bay Land Development or any other company from making an application to get another permit.

At the request of the Governor, in 1990 the National Park Service completed an analysis of alternatives for preserving the site. Alternatives range from NPS acquisition to maintenance of the status quo which allows development to proceed. Salt River Bay National Historical Park and Ecological Preserve (P.L. 102-247) was added to the National Park System in February 24, 1992. Acquisition funding in the amount of $3 million has been authorized for Fiscal Year 1994. The preserve received its first tract of land November 14, 1993, from The

Nature Conservancy. No funding has been requested for Fiscal Year 1995 due to the fact that the land protection plan has not been finalized. Delays in the approval of the land protection plan will delay protection of the landmark.

Vermont

Name: MOLLY BOG Location: Lamoille County

Ownership: State (Agency of Natural Resources), Private

Designation: May 1973 Section 8 Listings: 1988-1989, 1992-1996

SIGNIFICANCE The site is a classic example of a small, early successional unspoiled cold northern bog.

DESCRIPTION The 110-acre site contains a bog pond surrounded by a sphagnum moss floating mat. This is surrounded by a semi-open relatively dry bog, with scattered low black spruce and tamarack forest.

THREAT OR DAMAGE

Source Activities:
- timbering
- farming

Resource Impacts:
- WATER: potential water flow disruption
- ECOSYSTEM: potential pollution

Summary

The major threats are due to adjacent agricultural practices and potential continued logging very close to the sensitive wetlands.

CURRENT SITUATION The Vermont field office of The Nature Conservancy (TNC) has been working with the University of Vermont since 1988 to acquire additional land around Molly Bog to act as a buffer and to be included in the University's Molly Bog Natural Area. The University of Vermont owns 35 acres of the NNL and has posted signs to keep people out of the bog area along their land.

Much activity adjacent to the NNL has occurred. One private owner has cleared land up to the University of Vermont ownership boundary. TNC has a formal agreement with the owner that he will not log his property and will give TNC right of first refusal if he decides to sell 50-60 acres of land. Another private landowner clearcut his land about eight years ago, which may have altered surface water flow and caused erosion. Much of this is now growing back with early successional trees and shrubs. The Vermont Land Trust negotiated an easement to keep a 50-foot buffer around the wetlands while allowing agricultural use. Another private landowner has an adjacent Christmas tree farm that is within 50 feet of the landmark boundary. This potential runoff of fertilizers and herbicides is a great concern to water quality. Expansion of tree farming or land sale is a future possibility.

Attempts are underway to get the State Water Resources Board to reclassify the wetlands from Class 2 to Class 1. Reclassifying the Molly Bog Peatland Complex (i.e., Molly Bog and surrounding forested peatland and bogs) would give the wetland another 50 feet of protection. This has not yet been accomplished. The University of Vermont is developing a Site Conservation Plan to better understand the areas and its issues. Land prices and development pressure has increased due to nearby major ski resorts.

Virginia

Name: VIRGINIA COAST RESERVE Location: Accomack and Northampton Counties

Ownership: Federal (Fish and Wildlife Service), Private

Designation: March 1979 Section 8 Listings: 1985-1989, 1993-1996

SIGNIFICANCE This site is the most extensive, least altered barrier island-lagoon complex remaining along the Atlantic Coast of North America. It is extremely valuable as a refuge for migratory shorebirds and waterfowl, neotropical songbirds, and raptors.

DESCRIPTION This 35,000-acre site consists of a mosaic of 14 barrier islands, saltmarsh, lagoons, and mudflats, all in relatively undisturbed condition. It comprises the majority of the barrier island system of Virginia and contains an excellent representation of all the various vegetative communities once occurring on many barrier islands from North Carolina to New Jersey before human settlement.

THREAT OR DAMAGE

Source Activities:

- high-density residential development on the mainland
- increased visitor use
- boating traffic and off-road vehicle use
- non-point pollution of coastal bays
- impending construction of treatment plant

Resource Impacts:

- VEGETATION: destruction of dune-grassland complex
- WILDLIFE: potential disturbance of nesting bird colonies
- WATER: elevated nutrient input, potential pollution

Summary

Cedar Island, which is largely privately owned, has been subdivided into cross-island lots for second home development. Besides the destruction of dune grassland complexes and maritime thickets during house construction, development will result in increased vehicular traffic on the dunes and beaches, which would impact colonial nesting birds such as the little tern and Wilson's and piping plovers. The piping plover is listed as threatened in this part of its range (i.e., the Atlantic coast population).

A developer has constructed a recreational vehicle campground on a 900-acre tract on the mainland near Quinby, Virginia. Use of the campground may reach 2,000 persons a day and could go as high as 6,000-7,000. This high concentration of campers is likely to increase boat traffic to the islands, located approximately 8 miles across the bay, which could interfere with the breeding success of birds that nest on the beach or in low rookeries. Such species include piping and Wilson's plovers; little, common, and royal terns; black skimmers; and great egrets. Hog Island, the nearest island, likely will be the one most affected. Although the island can be posted, boaters have the right to beach below the high-water mark and so it is expected that enough people will land there or boat nearby to threaten the bird populations. The prospect of pollution and associated development does not exist.

CURRENT SITUATION More than 69 plots on Cedar Island, ranging in size from 2-9 acres, have been sold. The northern end of the island is eroding at a substantial rate and a few existing houses are being moved to the southern end of the island. The State has turned down many development applications. Approximately 2,000 acres of Cedar Island are currently owned and administered by the Fish and Wildlife Service's (FWS) Chincoteague National Wildlife Refuge. An additional 300 acres are also under conservation easement. At Quinby, the developer has constructed a pool, golf course, snack bar, office, and about 12 cabins, with plans for about 20 more. A harbor with boat slips and a ramp has also been constructed. Boat traffic from the campground so far has been modest, and no impacts have been observed yet. This campground development has recently been sold to another developer. Campground owners attempted to make the private campground into a public park for camping.

The Virginia Marine Resources Commission has revised their barrier island policy which now offers more protection for the islands. The site was designated an international biosphere reserve and an extensive monitoring program is being developed by the University of Virginia Long-Term Ecological Research Project (LETER) with National Science Foundation funding.

All of Assawomam Island and the northern portion of Metomkin Island are now owned by the FWS. The Nature Conservancy (TNC) purchased 20 acres on Hog Island and now owns all of Little Cobb Island. TNC funding purchased 1,800 acres near their headquarters. A regional sewage treatment plant is planned for construction near the town of Exmore, although on the mainland and outside the reserve, but has been turned down because the district commission could not get 80% of citizens to sign up. Therefore, the prospect of pollution of lagoons in the reserve and accelerated development in the area resulting from plant construction does exist. Old Dominion University has launched the Eastern Shore Institute to further sustainable use initiatives. A Virginia Barrier Island Avian Alliance has been created to further the conservation of migratory and nesting birds. TNC purchased approximately 1/4 of the waterfront in the village of Willis Wharf. Plans are underway to include land in the biosphere reserve project. The FWS is currently beginning a planning effort to study needs for additional protection of habitat on the Delmarva Peninsula, and the possibilities for a cooperative protection approach in this area.

The Virginia General Assembly passed legislation identifying the State owned "commons"- nearly 30,000 acres of pristine marsh and meadowlands in the barrier island/lagoon system-and is setting up a management authority in the Virginia Marine Resources Commission along with a Management Advisory Committee. The Port of Cape Charles was designated as a "Sustainable Technologies Industrial Park" by the President's Council on Sustainable Development.

The Nature Conservancy recently completed aerial surveys and mapping of the relative distribution of *Phragmites sp.* an invasive grass on the upland/marsh ecotone and on the barrier islands. It showed the grass is invading many pristine wetland habitats in the interior of the barrier islands and along the mainland edge. TNC has also been doing a shorebird census for the last three years. They discovered that Neotropical migrant whimbrels numbered 215,000 birds a day during the Spring migration, the highest ever recorded in the Western Hemisphere.

Washington

Name: DRUMHELLER CHANNELS Location: Adams County

Ownership: Federal (Fish and Wildlife Service), State (Department of Wildlife), Private

Designation: May 1986 Section 8 Listing: 1995-1996

SIGNIFICANCE: The site is the most spectacular example of "butte-and-basin" scabland in the Columbia Plateau Natural Region.

DESCRIPTION: This 44,906 acre tract illustrates the dramatic modification of the Columbia Plateau volcanic terrain by the late Pleistocene catastrophic glacial outburst floods that occurred at a scale unparalleled on Earth. This erosional landscape is characterized by hundreds of isolated steep-sided hills surrounded by a braided network of underfit channels.

THREAT OR DAMAGE:

Source Activities:
  theft/vandalism
Resource Impacts:
  GEOLOGY-destruction of erosional features
Summary
  Four columnar basalt outcrops were stolen from a headwall.

CURRENT SITUATION: As a result of illegal trespass, involving the use of a crane and flatbed semi-trailers, four basalt columns (i.e. columnar basalt outcrops) were extracted from a headwall area within Drumheller Channels National Natural Landmark, which is part of the Columbia National Wildlife Refuge. Evidence at the scene of the crime indicate that approximately four additional basalt columns were damaged (i.e. destroyed) as part of this illegal activity. All of the columns are approximately twenty feet in height and weigh 5-10 tons each. The alleged perpetrators also damaged vegetation and soils as a result of off-road vehicular impacts leading for a distance of almost one mile across the landscape to the crime scene.

The U.S. Fish and Wildlife Service is working through the U.S. Attorneys Office in the prosecution of this case. The basalt columns have been located and the perpetrator(s) identified. The National Park Service in cooperation with the U.S. Geological Survey have been working with the Project Leader for the Columbia Plateau National Wildlife Refuge in the development of the case for the United States. Presently, the case remains in the U.S. Attorney's Office pending prosecution.

Washington

Name: POINT OF ARCHES Location: Clallam County

Ownership: Federal (National Park Service)

Designation: June 1971 Section 8 Listing: None

SIGNIFICANCE: Relatively isolated pristine spectrum of environmental conditions from rocky tidelands to climax upland vegetation, and an outstanding exhibit of sea action in sculpting a rocky shoreline.

DESCRIPTION: This 168 acre site within Olympic National Park is characterized by spectacular offshore rocks, stacks, tunnels, inlets and tide pools. The uplands adjacent to the headlands show evidence of past glaciation and are forested with hemlock, cedar and spruce

THREAT OR DAMAGE:

Source Activities:
  proposed mining
Resource Impacts:
  ECOSYSTEM-potential vegetative removal and marine pollution
Summary
  Purported owner of reserved mineral rights plans to pursue mining exploration.

CURRENT SITUATION: The mining contractor/operators representing the owners of the reserved mineral rights, have stated that they intend to aggressively pursue mineral analysis, sampling, exploration and exploitation activities which would result in irreparable resource damage to the uplands and beach located on Tract 41-130 within Olympic National Park. The threat of mining is considered serious by the National Park Service and would endanger the natural resources, marine life and wildlife habitats within Olympic National Park, the Olympic Coast National Marine Sanctuary and Point of Arches National Natural Landmark (NNL). The reserved mineral right (i.e. Warranty Deed) of 1928 reserve unto the heirs the mineral rights for "...all oils, gases, coal, ores, mineral and fossils ... of the subject property (i.e. 161.85 acres)." The area includes 1.5 miles of coastline that is located at the most northwestern portion of Olympic National Park and situated immediately south of the Makah Indian Reservation. The northern boundary of the subject property is located one-half mile south of the southern boundary of the Makah Indian Reservation and just north of Point of Arches NNL.

The threat of mineral exploration and related activities would result in significant resource damages and disturbances to both the terrestrial and marine resources of Olympic National Park and Point of Arches NNL. Resources affected include second and old growth forest habitats, soils, geology, springs, creeks, tidepools, threatened and endangered species (e.g. bald eagles, marbled murrelets), indigenous birds, upland wildlife species, aesthetics (e.g. night sky, scenic vistas), wilderness values, and the marine environment (e.g. fishery resources). Fishery resources include but are not limited to sea lion, Pacific harbor seal, harbor porpoise, California gray whale, sea otter, and a variety of fish and invertebrates such as steelhead, sea-run cutthroat trout, groundfish, halibut, flounder, lingcod, pink shrimp, Dungeness crab, and others.

West Virginia

Name: BIG RUN BOG Location: Tucker County

Ownership: Federal (Forest Service)

Designation: December 1974 Section 8 Listings: None

SIGNIFICANCE: The area contains a relict Pleistocene high altitude northern sphagnum-red spruce bog far south of its normal range, with large numbers of rare plants and animals.

DESCRIPTION: This 1,640 acre tract contains a 50-acre northern sphagnum bog located in an amphitheater-shaped valley head at an elevation of 3,220 feet. The surrounding slopes are forested with second-growth stands of beech-maple and mixed oaks providing protection for the watershed.

THREAT OR DAMAGE:

Source Activities

Proposed highway construction

Resource Impacts

ECOSYSTEM: loss of habitat, potential alteration of wetland hydrology, potential toxic runoff, erosion

Summary

A proposed highway, if constructed, will pass through the northern portion of the national natural landmark (NNL).

CURRENT SITUATION: The Appalachian Corridor H is a proposed 114-mile federal four-lane highway intended expedite the trip from the Washington D.C. area to the scenic West Virginia mountains. It would run between Elkins, West Virginia and I-66 and I-81 at Strasburg, Virginia. Its conception dates back to 1965. The first EIS was prepared in 1981, but the project was put on hold. In 1990, the West Virginia Department of Transportation and the Federal Highway Administration resumed the project. In 1995, Corridor H was included as a component of the National Highway System adopted by Congress.

The project has been funded by two federal agencies--the Department of Transportation and the Appalachian Regional Commission. In FY 96, $109 million was appropriated for the Appalachian Corridor Highways to be shared among 13 states. Senator Robert Byrd introduced S.1881 to get additional funding for this project. The West Virginia Division of Highways indicates the project will cost $1.1 billion, or $10-12 million per mile.

A Final Appalachian Corridor H Environmental Impact Statement (EIS) was approved on June 22, 1995, by the West Virginia Department of Transportation and on March 8, 1996 by the Federal Highway Administration. An Alignment Selection Supplemental Draft EIS for Corridor H located the "preferred routing" 1,900 feet north of the bog itself. The Corps of Engineers issued a Section 404 permit for the project.

This EIS process did not consider the existence of the 1,640 acre NNL. Additionally, the Forest Service is currently proposing to establish a 632-acre Research Natural Area containing the bog and surrounding headlands.

West Virginia

Name: CANAAN VALLEY Location: Tucker County

Ownership: Federal (Fish and Wildlife Service), Private

Designation: December 1974 Section Listings: 1977-1989, 1993-1996

SIGNIFICANCE The area contains a diverse assemblage of relict northern boreal communities seldom found in the eastern United States and unique at this latitude with respect to size, elevation, and diversity. Canaan Valley contains approximately 8,400 acres of wetlands. This is the largest wetland in West Virginia, the State with the least land area in wetlands.

THREAT OR DAMAGE

Source Activities:

off-road vehicles (ORVs) and crowds, often associated with festivals and meets

Resource Impacts:

WATER: impacts to water quality and change in local hydrology

VEGETATION: loss of vegetation and disruption of soil system

Summary

The biggest impacts have resulted from heavy uncontrolled ORV use and more controlled sanctioned motorcross races. The effects of general ORV use in Canaan Valley have severely reduced plant species and communities. Soil erosion and siltation to streams has been associated with loss of plant communities. During and after the Blackwater 100 race, a drop in water quality was documented by the US Geological Survey.

CURRENT SITUATION The US Fish and Wildlife Service (FWS) is purchasing land on a willing-seller basis for the authorized wildlife refuge. The Canaan Valley National Wildlife Refuge was established in the southern portion of Canaan Valley on August 11, 1994. The FWS is currently working to acquire several additional tracts in the south end of Canaan Valley within the 24,000-acre approved boundary. The Monongahela Power Company, the major land owner in Canaan Valley, is no longer permitting any wheeled vehicles on their land. Growing environmental concerns caused the company to re-evaluate its policy and restrict vehicular traffic in the area thereby significantly reducing the threat of ORV damage. To date, FWS has acquired 725 core acres in the south end of the Valley with the assistance of the Conservation Fund. The opportunity exists to more than double this 725 acres based on offers by willing sellers of other key tracts.

West Virginia

Name: GERMANY VALLEY KARST AREA **Location: Pendleton County**

Ownership: Federal (U.S. Forest Service), Private

Designation: May 1973 **Section 8 Listing:** 1993-1996

SIGNIFICANCE This site is one of the largest cove or intermountain karst areas in the country, unique because all the ground-water recharge and solution activities are controlled by precipitation levels within the cove. Two of the 13 large caves within the area are home to 6,800 Indiana bats, 6,800 Virginia big-eared bats (both endangered species) and 66,600 little brown bats.

DESCRIPTION This 82,000-acre site contains 13 large caves. Two of the 13 caves contain significant numbers of endangered bats and one cave has a vertical drop of 100-200 feet.

THREAT OR DAMAGE

Source Activities:

quarrying

Resource Impacts:

WILDLIFE: potential disturbance to bat populations

Summary

Some cave passages may go underneath land owned by a mining company that is quarrying. This quarrying could disturb the bat populations, water quality, cave formations, and cave climate (air flow, temperature, and humidity).

CURRENT SITUATION The long-term impact of quarrying is unknown. The caves nearest to the quarrying are Hellhole and Schoolhouse. The State Division of Natural Resources is coordinating mapping the Hellhole cave passageways. As of October 1996, 8.0 miles of cave passageways are mapped. New passageways were opened up by a flood (November 1985), thus mapping is expected to continue over the next several years. Information indicates that most passageways trend away from the quarrying site, and the quarrying operation is moving away from the cave passageways and their roosting/hibernation habitat, including significant numbers of endangered bats. The quarry operator is aware of the concern to Hellhole Cave. There are no known adverse impacts to Hellhole Cave or the bats it harbors from the present quarrying operation and direction. The site is being retained on Section 8 for another year until the outcome of this situation is very certain.

Wisconsin

Name: BARABOO RANGE Location: Sauk County

Ownership: State (Department of Natural Resources), Private

Designation: February 1980 Section Listings: 1993-1996

SIGNIFICANCE This site is an example of an exhumed mountain range illustrating a changing landscape through geologic time. It is the largest tract of mostly unfragmented deciduous forest remaining in the upper Midwest. At least 28 different natural communities have been identified, harboring 23 Federal or State listed species.

DESCRIPTION The 50,000-acre site is exhumed Precambrian basement rock, surrounded by a plain developed on Paleozoic strata. The eastern portion of the area has been glaciated by the Green Bay Lobe of the Wisconsin Stage of the Pleistocene glaciation. The differences in elevation, exposure, and soils create a variety of habitats, including high, dry rock strata where white pine predominates; rocky cliffs covered with lichens and mosses; cool steep valleys and ravines with hemlock; dry and wet prairie; and marshes. To date, about 1096 of the more than 2200 vascular plants in Wisconsin have been found in this tiny fraction of the State.

THREAT OR DAMAGE

Source Activities:

development, quarrying, logging and recreational impacts, pending highway construction, and proposed liberalization of septic system rules

Resource Impacts:

ECOSYSTEM: potential degradation from increasing development and human population pressure

Summary

There are two road projects pending which will increase access to the national natural landmark. One will replace a ferry. Proposed liberalization of state septic system rules will also contribute to more development.

CURRENT SITUATION There is planned expansion of U.S. Highway 12 from two to four lanes from the Illinois border to the Wisconsin Dells. The first phase of this expansion is set to begin in 1998 with a four-lane improvement in northwest Dane County to Sauk City. An updated draft supplemental draft EIS was published in October, 1996. The second highway project is potential replacement of the highway 113 ferry at Merrimac with a bridge.

Additionally, the liberalization of septic system rules has been proposed by the state Department of Industry, Labor and Human Relations, and by legislators (Assembly Bill 81 and Assembly Bill 112). The proposals would allow "mound" septic systems to be constructed on soils that are currently judged too thin for standard septic systems. The Baraboo Hills is a thin soil region.

In May 1994, the Wisconsin Supreme Court overruled the 4th District Court of Appeals when it made the decision that Sauk County had the right to deny a controversial mining permit to a company that has been mining in the area of Lower Narrows. A private conservation group, Friends of Baraboo Range, is pushing for expansion of the National Natural Landmark and protection of the whole region.

In September of 1996, Sauk County initiated a county-wide land use planning effort which will include the Sauk County Portion of the Baraboo Hills. It will look at ways to protect the integrity of the Baraboo Hills. The State Department of Natural Resources in partnership with The Nature Conservancy (TNC) is completing a biological survey of public and private lands in the Baraboo Range. TNC has designated this area as one of the "Last Great Places" and has increased its land acquisition and cooperative landowner programs during the last year. The State Department of Natural Resources has dedicated full-time staff to assist landowners in developing forest management plans. It has recently expanded Devil's Lake State Park which is the largest publicly owned tract in the Baraboo area and is evaluating additional land acquisition and natural area designation.

Wisconsin

Name: **CAVE OF THE MOUNDS** **Location:** **Dane County**

Ownership: Private

Designation: July 1987 **Section 8 Listing:** 1994-1996

SIGNIFICANCE The site provides an exceptional illustration of two principal modes of cave formation.

DESCRIPTION This cave formed by vadose water flowing above the water table and by phreatic groundwater flowing below it. Speleothems are abundant and of great variety. Passage length is 516 meters and average depth is 12 meters. Located within the glaciated part of Wisconsin, groundwater movements and sediments within the cave can be dated and correlated to interglacial periods.

THREAT OR DAMAGE

Source Activities:

nearby residential development

Resource Impacts:

WATER: potential groundwater contamination

GEOLOGY: potential damage from blasting

Summary

The first phase of construction of a residential subdivision within 1/8-1/4 mile of the cave is nearly completed. Plans are underway to move forward with Phase II which will place homes within 300 feet of active sinkholes.

CURRENT SITUATION The owner of the national natural landmark voiced concern in April 1994 to the Village of Blue Mounds Board about ordinances that might protect his cave from adjacent residential construction. Blasting has been used to install sewage lines which caused windows of the gift shop at the cave entrance to rattle. Blasting may be used for residential basement excavations as well. State of Wisconsin regulations covering blasting work do not cover the effects of "compression waves," the kind that would affect and potentially damage the cave and its formations. Phase II of the subdivision will bring the development within 300 feet of active sink holes on the cave owner's property.

Cave of the Mounds Road, which passes over a portion of the cave, will increase in traffic. Increased residential traffic over time, as well as the passage of heavier construction vehicles, will create vibrations that could damage cave features. Hydrological studies of the cave have not been conducted, but there is potential for degradation of the groundwater feeding the cave due to fertilizer, herbicide, and pesticide use by future homeowners. The State of Wisconsin Geological Survey is considering hydrological mapping of the entire State, and Dane County would be the first to receive attention.

Wisconsin

Name: KICKAPOO RIVER NATURAL AREA **Location: Vernon County**

Ownership: Federal (Army Corps of Engineers), State (Department of Natural Resources)

Designation: May 1975 Section 8 Listings: 1977-1980, 1983-1989, 1992-1996

SIGNIFICANCE This complex geological area supports a variety of microhabitats comprising a highly diverse ecological area that includes 10 different plant community types, more than 600 individual plant species, more than 30 relict, rare, threatened, or endangered plant species, and more than 100 species of breeding birds.

DESCRIPTION This 5,795-acre site contains sandstone cliffs, limestone ridges, meanders, and diverse plant life.

THREAT OR DAMAGE

Source Activities:
- highway construction
- dam and reservoir construction

Resource Impacts:
- ECOSYSTEM: removal for highway
- VEGETATION: potential permanent flooding, potential destruction of rare species

Summary

The Wisconsin Department of Transportation is planning to reconstruct State Highway 131 and Highway 33 through the national natural landmark (NNL) which will destroy natural habitat. An Environmental Impact Statement is underway. The Wisconsin Department of Natural Resources (DNR) has been negotiating with the Department of Transportation for an environmentally acceptable route for reconstruction of State Highways 131 and 133.

Construction of the LaFarge Dam proceeded for several years prior to 1975, and included completion of the right abutment embankment, the intake collar for the pool, and a low-flow conduit. Construction was stopped in 1975. Deauthorization is being sought.

CURRENT SITUATION The Wisconsin Department of Transportation has considered about twelve alternative routes for State Highway 131, but the preferred route and many of the alternative routes go through the NNL. The Corps of Engineers (Corps) had provided an easement for the original highway alignment that was compatible with the flood control project. No new easements have been granted.

A large amount of ORV abuse is occurring on the Federal portion of the property. The Corps site manager is 50 miles away. ORV use is not allowed.

Construction of the LaFarge Dam was halted because of its potential environmental impacts, lack of economic feasibility, and lack of political support. A report prepared by the Corps in 1984 concluded that construction of either a dry dam or a wet dam would be economically unfeasible. The Corps will continue operation and protection, safety, and sanitation until the project is deauthorized. They are in the process of changing the authorization for this project to exclude the proposed dam.

The Wisconsin Department of Natural Resources is opposed to the proposed dam project because of predicted adverse environmental impacts on the scenic and biological resources at the site and the predicted poor water quality of the reservoir. Governor Tommy Thompson signed into law a bill (SB 721), which will speed up expected deauthorization of the dam and transfer of the 8,500 Federally owned acres to the State. The reserve would be administered by a nine member board attached to the Department of Administration. The Governor appointed a citizens advisory board to develop a plan for the area once it is deauthorized. The plan calls for the Federal government to return the land back to State management. Uses allowed in the plan will be hiking, canoeing, hunting, fishing, and horseback riding. There is local opposition to this plan. Federal legislation to deauthorize Corps of Engineers lands died in the Senate but was introduced on January 4, 1995. The Wisconsin Department of Natural Resources is completing a biotic inventory of the entire Corps project area. The site is being maintained on the Section 8 Report until this situation is more stable.

APPENDIX:

1. CLASSIFICATION SCHEMES FOR RESOURCE IMPACTS AND SOURCE ACTIVITIES CAUSING THOSE IMPACTS
2. NUMERICAL SUMMARY OF THE 1996 REPORT BY STATE AND NPS REGION

CLASSIFICATION SCHEMES

I. RESOURCE IMPACTS

A. Water resources
  1. degradation of water quality by:
    a. organic wastes
    b. inorganic waste
    c. salts
    d. hydrocarbons
    e. garbage/refuse disposal
    f. radioactive waste
    g. hydrothermal pollution
    h. siltation
    i. eutrophication
    j. disease organisms
    k. mining wastes
    l. acidification
    m. multiple or unknown agents
    n. other
  2. alteration of water table:
    a. permanent flooding
    b. permanent drainage or extraction
    c. periodic fluctuation
  3. alteration of stream flow:
    a. alteration of channel configuration
    b. discharge manipulation
    c. disruption of drainage network
  4. alteration of coastal processes
    a. interruption of longshore transport
    b. interruption of tidal flow
    c. disruption of current patterns
  5. other

B. Air
  1. degradation of air quality by:
    a. visible pollutants (particulates)
    b. non-visible pollutants
  2. odors
  3. other

C. Geologic/Paleontologic Resources
  1. alteration of soil or sediment chemistry by:
    a. organic pollution
    b. inorganic pollution
    c. salts
    d. hydrocarbon pollution
    e. radioactive pollution
    f. leaching, loss of soil nutrients
    g. burning
    h. other

- 2. structural alteration
    - a. soil compaction
    - b. fracturing; shattering
    - c. slump, slide, or debris flow
    - d. faulting
    - e. seismic disruption
    - f. beach erosion and redeposition
    - g. other
- 3. extraction or removal
    - a. surficial erosion
    - b. surficial defacing
    - c. specimen collecting
    - d. surficial extraction (strip mine, etc.)
    - e. subsurface extraction (drilling, mine shaft, etc.)
- 4. other

D. Vegetation

- 1. large-scale removal or complete destruction
    - a. one-time removal/destruction
    - b. periodic removal and replanting
- 2. degradation
    - a. chemical contamination (air pollution, herbicide)
    - b. physical destruction (trampling, etc.)
    - c. biological (infestation, browsing, grazing)
- 3. alteration of characteristic species composition
    - a. succession by non-native plant species
    - b. acceleration of natural succession
- 4. disturbance or removal of rare, threatened, or endangered species
- 5. other

E. Wildlife

- 1. alteration of population numbers
    - a. overpopulation
    - b. underpopulation
    - c. destruction of population
- 2. alteration of population dynamics
    - a. disruption of migration patterns
    - b. disruption of breeding patterns
- 3. disturbance of individuals
    - a. harassment
    - b. destruction
- 4. disturbance or removal of rare, threatened, or endangered species
- 5. other

F. Entire ecosystem
  1. inundation by flooding
    a. permanent
    b. periodic
  2. wetland drainage
  3. burial
  4. destruction by natural process
  5. destruction by human activity
  6. other

II. SOURCE ACTIVITIES

A. Construction/operation of structures
  1. residential
  2. commercial
    a. ski resort
    b. other
  3. recreational
    a. visitor information centers
    b. foot path, trail, bike path
    c. other
  4. industrial
    a. chemical plant
    b. oil refinery
    c. other
  5. utilities
    a. powerline
    b. pipeline
    c. power plant
    d. sewage treatment plant
    e. water treatment plant
    f. other
  6. transportation facilities
    a. road or highway
    b. railroad
    c. other pathway for vehicles
    d. bridge
    e. airport
    f. other
  7. other

B. Water projects
  1. impoundment structures
    a. dam and artificial reservoir
    b. other flood control structure

- 2. channel engineering
    - a. stream channelization
    - b. channel dredging
    - c. canal or other artificial waterway
    - d. associated road construction
- 3. ditching and diking
- 4. coastal fortifications
    - a. rip-rap
    - b. groins
    - c. jetty or breakwater
- 5. other

C. Agricultural/forestry activities

- 1. agricultural use
    - a. conversion of land to agriculture
    - b. agricultural irrigation
    - c. insecticide/herbicide spraying
    - d. use of fertilizers
- 2. forestry practices
    - a. logging; single event
    - b. repeated logging
    - c. tree farm
- 3. livestock use
    - a. grazing/trampling by domestic livestock
    - b. livestock-feces
- 4. associated by-products of agricultural and forestry practices
    - a. runoff, siltation, or erosion
    - b. associated road construction
- 5. other

D. Exploration/extraction of geologic resources

- 1. exploration or extraction
    - a. coal
    - b. oil/gas
    - c. minerals, ores
    - d. rock materials
    - e. geothermal
    - f. placer
    - g. sand and gravel; cinders
    - h. peat
    - i. other
- 2. associated by-products of exploration or extraction
    - a. spoil deposition
    - b. acid mine drainage
    - c. runoff from quarry or mining operations
    - d. associated roads and/or staging areas
    - e. other

3. abandoned mining operations
4. other

E. Visitor use
  1. modes of travel
     a. trail use by hikers or horses
     b. off-trail use by hikers or horses
     c. off-road vehicle (ORV)/all terrain vehicle (ATV) use
     d. boating, air-boats
  2. camping; camp-fire building
  3. vandalism, littering
  4. arson
  5. wildlife harassment
  6. hunting, poaching
  7. specimen collecting
  8. other

F. Waste disposal and resource contamination
  1. dump-site location
     a. hazardous
     b. non-hazardous
     c. nuclear dump-site characterization (DOE)
  2. other waste disposal
     a. hazardous
     b. non-hazardous
  3. acid precipitation/deposition
     a. near-source (<50 km)
     b. far-source (>50 km)
  4. oil spill
  5. urban run-off
  6. other non-point-source pollution
  7. other

G. Military activities
  1. weapons testing
     a. nuclear
     b. non-nuclear
  2. military facility siting
  3. military exercises
     a. ground maneuvers
     b. aircraft overflight
  4. other

H. Physical processes
  1. fire
  2. wind erosion
  3. hydrologic systems

        a. flooding
        b. drainage
        c. siltation; sedimentation
        d. surficial erosion or gullying
    4. landslide
    5. snow avalanche
    6. earthquake
    7. fault movement
    8. volcanic eruption
    9. tsunami
    10. other

I. Weather phenomena
    1. wind storm; tornado
    2. precipitation-related conditions
        a. drought
        b. excessive precipitation
        c. unnatural effects of cloud-seeding
    3. temperature extremes
    4. other

J. Ecological processes

    1. floral processes
        a. native plant succession
        b. introduction/invasion of exotic vegetation
        c. eutrophication
    2. wildlife dynamics
        a. introduction/invasion of exotic animals
        b. feral animals
        c. overpopulation
    3. pestilence
        a. insect infestation (Gypsy Moth, etc.)
        b. plant disease
        c. animal disease
    4. other

K. Unknown

L. Other

1996 NNL STATUS REPORTS BY STATE

STATE	NUMBER OF NNLS	STATUS REPORTS SUBMITTED
Alabama	7	7
Alaska	17	17
American Samoa	7	0
Arizona	9	9
Arkansas	5	0
California	34	8
Colorado	11	8
Connecticut	7	0
Delaware	0	0
Florida	18	12
Georgia	12	8
Guam	4	0
Hawaii	7	0
Idaho	11	9
Illinois	18	18
Indiana	29	29
Iowa	7	7
Kansas	5	3
Kentucky	6	0
Louisiana	0	0
Maine	15	4
Maryland	5	0
Massachusetts	11	2
Michigan	12	12
Minnesota	7	7
Mississippi	5	3
Missouri	16	15
Montana	10	5
Nebraska	4	3
Nevada	6	3
New Hampshire	11	0
New Jersey	11	0
New Mexico	12	5
New York	26	0
North Carolina	13	8
North Dakota	4	1
Ohio	23	17
Oklahoma	3	0
Oregon	6	6
Pennsylvania	26	3
Puerto Rico	5	0
Rhode Island	1	0
South Carolina	6	3

South Dakota	13	7
Tennessee	13	11
Texas	19	8
Utah	4	4
Vermont	11	3
Virginia	10	1
Virgin Islands	7	0
Washington	17	17
West Virginia	15	1
Wisconsin	18	9
Wyoming	8	1
TOTAL	587	294

1996 NNL STATUS REPORTS SUBMITTED BY NPS REGION

NPS REGION	NUMBER OF NNLS	REPORTS SUBMITTED	PERCENT SUBMITTED
Alaska	17	17	100.0
Mid-Atlantic	35	5	14.5
Midwest	140	116	88.5
North Atlantic	93	9	9.6
Pacific Northwest	34	32	94.1
Rocky Mountain	50	18	36.0
Southeast	92	65	70.5
Southwest	40	22	55.0
Western	66	10	15.1
National Capital	20	0	00.0
	587	294	50.1%

END

09/25/98